



IMPERIAL AGRICULTURAL
RESEARCH INSTITUTE, NEW DELHI.

CONTENTS

	PAGE
NEW YEAR'S MESSAGE:	
1. The Hon. J. G. N. Strauss, K.C., Minister of Agriculture and Forestry	3
11. Dr. C. H. Neveling, Secretary for Agriculture	5
HORTICULTURE:	
Spraying Citrus Trees for Mineral Deficiencies (Dr. P. F. Malan)	8
Guava Varieties in S.A. (F. J. H. le Riche)	9
ANIMAL HUSBANDRY:	
Diagnosing Cases of Poisoning (Dr. D. G. Steyn)	29
Fowl Typhoid (J. D. W. A. Coles)	38
The Value of Lucerne as Grazing for Pigs (G. W. Johnston)	45
FIELD HUSBANDRY:	
Krommek Disease of Tobacco	1
Turkish Tobacco	24
The Dry-Lands Problem in the North-Eastern C.P. (C. E. M. Tidmarsh)	27
Fertilizing of Maize: Effect of Phosphate, Nitrogen, Potash and Compost (L. L. Eksteen)	34
VELD MANAGEMENT:	
Veld Management in the Southern Transvaal and North-Eastern O.F.S. (R. E. Foster)	19
Biological Control of Prickly Pear (Dr. F. W. Pettey)	31
Veld Management in South-Eastern Border Districts of the C.P. (J. H. Preller)	41
GENERAL:	
Farming is a Business (P. E. de Waal)	6
THE FARM HOME:	
Renovating Old Hats (Misses H. van Staden and P. J. Hattingh)	51
CROPS AND MARKETS	36748

[Photo on Cover: S.A.R. & H.]



[NOTE.—Articles from *Farming in South Africa* may be published provided acknowledgment of source is given.]

36748

FORD'S FOR SEEDS—A. FORD & Co. (Pty.) Ltd.

AGRICULTURAL SEEDSMEN.

SEED CONTRACTORS TO THE UNION GOVERNMENT,

P.O. BOX 5701. CATALOGUES FREE JOHANNESBURG.

Information on Departmental Publications.

Farming in South Africa, the monthly journal of the Department, contains popular as well as scientific articles on a variety of agricultural topics, useful to both the farmer and the housewife, while the **Crops and Markets** Section supplies information on crop prospects, market prices and exports of agricultural produce.

The following particulars in regard to subscriptions and advertisements should be noted:-

Subscription.—Within the Union, South West Africa, Bechuanaland Protectorate, Southern Rhodesia, Swaziland, Basutoland, Mocimbuque, Angola, Belgian Congo, and British Territories in Africa, 5s. (otherwise 7s. 6d.) per annum, post free, payable in advance.

Applications, with subscriptions, to be sent to the Government Printer, Bondan Street, Pretoria.

Advertisements.—*The Tariff for Classified Advertisements is: 2d. (two pence) a word with a minimum of 5s. per advertisement (prepaid). Repeats, not entailing any change in the wording, will be published at half the cost of the original.*

Conditions:—

- (1) The advertisement will be classified under specific headings, and only one black letter (initial letter) is permitted.
- (2) Advertisements in which prices are mentioned must contain the name and address of the advertiser. A non-despatch or box number only is not sufficient, and unless this condition is strictly observed, advertisements will not be accepted.
- (3) Advertisements will be checked strictly in accordance with the subject-matter of the announcement, determined by the first item mentioned and cannot be inserted under irrelevant headings.
- (4) Displayed, classified advertisements will also be accepted. The charge, however, will be 10/- per inch, single column, per insertion, without reduction for repeats.

Copy for Advertisements to be in the hands of the Government Printer, Pretoria, not later than the 20th of the month preceding publication.

Send all advertisements direct to the Government Printer, or write to him for details as to tariff for advertisements.

Popular Bulletins. Bulletins on various agricultural topics are published by the Department to meet public demand. A list of available bulletins giving particulars of cost, etc., is obtainable free of charge from the Editor, Department of Agriculture, Pretoria.

Scientific Publications. From time to time the different Divisions of the Department issue science bulletins incorporating the results of research work conducted by them. Other scientific publications issued are: "The Onderstepoort Journal", "Memoirs of the Botanical Survey of South Africa", "Bothalia", "Entomological Memoirs" and the "Annual Reports of the Low Temperature Research Institute". Information in regard to these publications is obtainable from the Editor, Department of Agriculture, Pretoria.

Press Service.—The Press of South Africa is now supplied with a bulletin of agricultural information for their exclusive use. This information is published fortnightly by all newspapers and other journals throughout the country.

Farmers' Radio Service.—In addition to the printed information supplied by the Department to members of the farming community, the Department, in collaboration with the South African Broadcasting Corporation, also maintains a daily broadcasting service to farmers. Information in regard to times of broadcasting is contained in the programmes issued by the Broadcasting Corporation.

Inquiries.—All general inquiries in regard to the publications of the Department including the Radio Service, should be addressed to the Editor, Department of Agriculture, Pretoria.

D. J. SEYMORE, Editor

New Year's Message.

By the Honourable J. G. N. Strauss, K.C., Minister of Agriculture and Forestry.

THE year 1945 will be engraved in capitals on the pages of world history. It brought the end of the most devastating war mankind has ever known. For us, in South Africa, the advent of peace holds just as much spiritual, social and economic significance as for countries lying closer to the scene of war, since peace does not go hand in hand with destruction, but with positive and constructive work.

Throughout the war you, as farmers, have with unmistakable fortitude defied every difficulty which loomed up out of these abnormal conditions. Actually a special and essential function was entrusted to you—that of food production. It is with pleasure and appreciation that I speak of this important task and the way in which it was performed by you. You have done your duty.

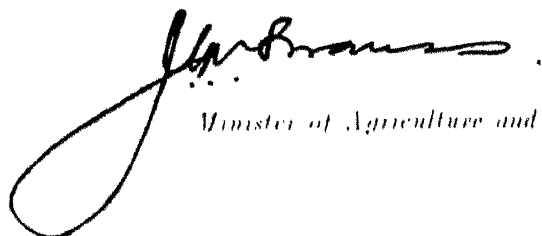


Nevertheless, I must stress the fact that peace is not in itself a solution to all our agricultural problems. Every war has its aftermath, which must be resisted with all the forces at our command. With you, therefore, rests not only the momentous task of continuing with the production of food for the nation; it is also your solemn duty to increase your efforts in connection with the work of rehabilitation and reconstruction, which is so essential for a sound agricultural industry in South Africa.

During the past year your greatest natural enemy, drought, very seriously hampered you in your work as producers. I know to what extent many of you have suffered in this respect. Our food position will undoubtedly be more difficult than it has been for many a year. The fault does not lie with you, but I wish to make an appeal to you to persevere, and, with that courage which is characteristic of the South African farmer, to achieve the best production results of which your farms are capable in the circumstances. Allow me one further request: We are on the eve of great developments for the post-war period; render your utmost assistance in the execution of the reconstruction schemes which are envisaged for the future of agriculture. This is quite as essential as the actual work of production.

The year 1946 has just begun. You will be faced with many difficulties. I hope you will find happiness and fulfilment in making your contribution towards overcoming these difficulties.

My best wishes to you all.



Minister of Agriculture and Forestry

Kromnek Disease of Tobacco.*

KROMNEK is a disease which is carried by small insects called thrips and which attacks a great variety of plants. One of the plants, tobacco, is in rather a different position from the rest. It is not a favoured host of the thrips. They do not breed easily on the leaves, and are in fact usually immobilized by the sticky leaf-hairs. Infection, it seems, is rarely picked up on tobacco plants; the thrips acquire it elsewhere— from weeds like stinkblair or crops like tomatoes—and, flying about in numbers, settle in tobacco fields which happen to be in their path. On tobacco they settle randomly, and where they settle, they stay; they bring infection into tobacco fields from without, but do not spread it from plant to plant within.

On these facts a method of controlling kromnek was devised which is recommended specifically for Virginia-leaf tobacco. By increasing the number of plants per morgen, the chance of any plant becoming infected by a settling thrips is correspondingly reduced. The denser the planting, the greater the number of plants over which the invading thrips are spread and the smaller the percentage which become infected. The recommendation made to tobacco growers in areas where kromnek is a menace is thus to transplant thickly. If there is danger of overcrowding as the plants become larger, the surplus plants can be thinned out as the need arises. The method of close planting is, therefore, most applicable during the stage before the plants are fully grown; it is usually during this stage that kromnek hits hardest.

Instead of increasing the number of plants per morgen by reducing the spacing between plants, one may keep to the standard spacing and transplant two or three plants together. In this way a hill is not lost unless every plant in it is infected, and both calculation and experience show that planting out in two's is enough to cope with ordinary outbreaks of kromnek, while planting out in three's will meet anything except quite abnormally severe epidemics.

* Science Bulletin No. 240, "Kromnek Disease of Tobacco", by J. E. v. d. Plank and E. E. Anderson, Price 3d. Obtainable from the Division of Botany and Plant Pathology, Pretoria.

FARMING IN SOUTH ... AFRICA

Vol. 21

JANUARY 1946

No. 238

A New Year's Message:

Produce more Food.

By Dr. C. H. Neveling, Secretary for Agriculture.

IN view of the gravity of the situation, I hardly know what to say to our farmers in this, my first New Year's message. When I assumed this new post in August I hoped—as farmers always do—that the summer season would be a favourable one and that we would enter into the first year of peace with most of our troubles behind us.

Alas, Providence decreed otherwise! Instead of refreshing rains, we experienced oppressive drought; in the place of abundance, there is scarcity, and even want. Not only was the wheat crop a failure, but the maize crop which plays such an enormous rôle in the feeding of both man and beast threatens to be an even bigger failure.

During the war years, the country's food supply was dependent upon our own production more than ever before, and the cessation of hostilities has by no means altered the position. On the contrary our dependence on our own production has been intensified; the meagre food supplies of the world must feed the

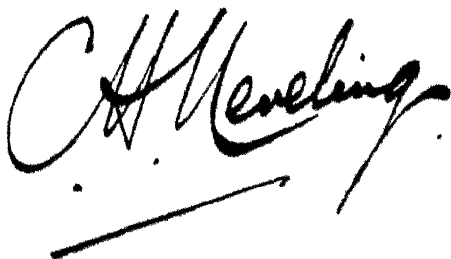


famine-stricken millions in Europe, and consequently, the possibilities of importation, particularly of staple products like wheat, maize and fats, are limited. South Africa must therefore look to her own farmers for food supplies in the coming year. The city-dweller recognizes this state of affairs to-day, and even if he does not always understand all the farmer's difficulties or is not fully alive to the seriousness of the drought and its effect on farming, he is nevertheless sympathetic and knows where his daily bread comes from.

In the coming year, a task unequalled in our history, will be laid upon our farmers. I know that they are alive to it and realize

that every extra mealie-cob and every extra ear of corn will be a contribution towards feeding the country in 1946. My advice is, therefore, put as much food into the ground as possible. Even if it is late in the season, we must be prepared to face the risk of early frost. Crops which do not mature in time, can always be utilized as stock feed, which is almost as essential as human food.

Fortunately, this country has wonderful powers of recovery, and happily, too, it has a farming population which has drawn from the many tribulations of nature in the past, the supreme qualities of courage and determination. We will emerge again; perhaps some what battered, certainly financially weakened, but, without a doubt, inwardly steeled and intellectually strengthened for the future.



Farming is a Business.

P. E. de Waal, Division of Economics and Markets.

MODERN farming is a business, and if a farmer wishes to make a success of it, it must be based on business principles.

It may have been unnecessary for our forefathers to do systematic bookkeeping, but to-day farming has become a business in the true sense of the word.

The modern farmer has an annual income in excess of the total capital investment of the farmer of 50 years ago. He borrows more money, and risks more money and credit; his costs are higher; he has a wider choice of products to produce and of equipment and implements for farm use; diseases and pests are far more prevalent; soil fertility is lower; and there are new markets and new methods for making his products available to the consumer. The chances of his making wrong decisions which may lead to losses and deterioration, are therefore much greater. In these circumstances it has become imperative for the farmer to make use of better business methods. He is very much in need of some method which will help him to make his choice and to decide along lines which will decrease his losses and increase his profits.

It is not an easy task constantly to keep in touch with and be fully informed about all the details of one's business. It is practically impossible for the farmer to remember in detail all the transactions which might influence his business policy. The manager who does not keep accounts, can hardly get a correct perspective of his farming enterprise. A business without bookkeeping may be compared to a watch without hands. It will go, but there is no way of determining how well or how badly.

FARMING IS A BUSINESS.

The farmer must continually ask himself these questions: "How large are the profits from my farming?", and "How can I increase these profits in the long run?" These questions cannot be answered satisfactorily unless there is a record from which the information can be obtained. The farmer not only wants to know whether his maize, cows, pigs, etc., are paying propositions—he must also know how the income from these and other sources compares with what he ought to receive for his labour, capital investment and the costs of production.

Many farmers realize that certain changes or adaptations in the various branches of their farming activities will increase the income from the enterprise as a whole. It is, however, impossible for them to determine the nature of the necessary alterations owing to lack of data on which such changes in the various branches of farming or in the methods may be based. It is impossible to make suggestions for an alteration or improvement in the farming system of a certain area or for a particular farm, before the facts are known. An ordinary bookkeeping book, properly kept and analyzed, will bring these facts to light. It will indicate the weak points in the business as well as the loopholes through which the farmers' profits are leaking out.

From this it must not be deduced that bookkeeping will always reveal that a change of policy is necessary. In any case bookkeeping constitutes a record of the past on which the farmer can base his future plans. An honest attempt at bookkeeping at least has the advantage that the farmer will pay more attention to the details of his farming enterprise. If records are correctly kept, they will eventually lead to a better understanding of farming as a whole, and in this manner to continual improvements, greater efficiency and higher profits. Many farmers have increased their income through adopting a system of bookkeeping. It usually takes a few years before the results can be observed, but farmers are assured that they will eventually obtain these results if they study their data honestly and attentively. In the first instance the farmer must make sure that his figures and their analysis are accurate and reliable. Many farmers do not keep accounts because they are under the impression that it is too complicated and that they know too little about bookkeeping, but it does not require any special education to be able to follow a simple system of bookkeeping. All that is necessary is a little time, patience and perseverance. If the data obtained in this way are carefully studied, analyzed and used, the farmer will be amply rewarded for the time spent on bookkeeping.

In a following article it will be shown that the farmer does not need a trained knowledge of bookkeeping if he applies a simple and effective system which has been specially devised for farmers in South Africa; and that, in most cases, it does not require much time to keep a record of the farming business from day to day. This discussion will take place on the basis of "Account Book for Farmers", a new, improved and simplified system of bookkeeping which has recently been designed and published by the Division of Economics and Markets.

RECONSTRUCTION OF AGRICULTURE.

A limited number of copies of the "Report of the Reconstruction Committee of the Department of Agriculture and Forestry" is still available. Applications for this Report, which is issued gratis, should be addressed to the Editor, Department of Agriculture, Pretoria.

Spraying Citrus Trees for Mineral Deficiencies.

Dr. P. F. Malan, Research Horticulturist, Subtropical Horticultural Research Station, Nelspruit.

THE requirements of citrus trees with regard to nitrogen, phosphorus, and potassium are well known to most growers. It has become evident, however, that the normal growth of plants also depends on the presence of some other elements which are required in small quantities only. These elements are described as trace elements; and, since they are usually present in soils, their importance was not so readily recognized. When such a trace element is absent, or present only in an insufficient quantity for normal growth, or present in such a form that the plant cannot absorb it, then a state of deficiency develops. The tree shows this by the development of characteristic symptoms such as chlorosis (i.e. the absence of green colouring matter in the leaves), necrosis (i.e. the development of dead tissue causing small dark spots on the leaves and/or dying-back of tips of shoots), or the formation of gum pockets. At first it was thought that these abnormalities were caused by plant pathogens or viruses, until it was shown that they could be corrected by the application of boron, zinc, copper, manganese or some other trace element. Usually plants obtain all the necessary mineral nutrients from the soil but when it is uneconomical or a lengthy process to correct the deficiency by applying the deficient element to the soil, other methods, such as spraying the leaves, have to be resorted to. Trace elements are frequently applied in this way, although other elements, as for instance magnesium, can also be applied to a plant by means of a foliage spray.

Symptoms of Deficiency.

During the past ten years it has been found that certain soils of the Union do not have adequate supplies of zinc, manganese, copper and magnesium for the needs of citrus trees. Some soils are low in only one of these elements, others in more, but a deficiency of zinc is encountered in citrus trees in many parts of the Union. The symptoms are a mottling of the leaves and the formation of undersized leaves. In severe cases the trees die back completely. Growers are usually not concerned about a slight incidence of mottle-leaf, and only spray when the condition becomes fairly acute, but this practice should be abandoned. Agricultural workers in Florida have observed cases where the yields of orange trees have dropped 25 per cent. before the mottling appeared and they ascribe the decrease in yield to a zinc deficiency. These observations have not been made in the Union and in California, where it has been found that yields are not seriously affected when only a few mottled leaves can be seen on the trees. However, a number of physiological diseases of citrus are associated with zinc deficiency and it would be good orchard practice to keep citrus trees free from mottle-leaf wherever possible.

Zinc is best applied to citrus trees in the form of a foliage spray. Soil applications are usually uneconomical and the possibility always exists that severe injury may be caused to the trees. As a source of zinc, commercial zinc sulphate is the most satisfactory because it is inexpensive and safe to use after the zinc is precipitated in a relatively insoluble form. Hydrated lime or crude sodium carbonate (soda ash) may be used for this latter purpose. In cases of acute

Guava Varieties in South Africa.

F. J. H. le Riche, Western Province Fruit Research Station,
Stellenbosch.

THE common guava, *Psidium guajava*, was introduced into South Africa some fifty years ago and has since been widely propagated from seeds. This has resulted not only in the scores of different types found in commercial orchards to-day, but also in the general confusion which at present characterizes the nomenclature of guava varieties. The raising of trees from the seed of an outstanding fruit does not guarantee uniformity in the progeny which will vary in productivity, as well as in respect of the time of ripening, colour of flesh, and ascorbic acid content of their fruit.

This unsatisfactory state of affairs, together with the entire lack of knowledge in regard to varietal characteristics, both chemical and nutritional, called for the characterization of the varieties as well as a detailed study of their compositional characteristics.

The published researches dealing with this subject are limited and largely concerned with the ascorbic acid content of the fruit.

Stennes (1931) and Thursby (1932) discussed in detail the use of guaves in commercial and household menus. From the viewpoint of food values, the guava is one of the richest sources of vitamin C. In this respect, Miller and Bazore (1936) stated that greater use should be made of guavas than at present, because they are an excellent source of vitamin C, fairly high in vitamins A and B, rich in iron and moderately rich in calcium, while the phosphorus content is fair.

Recently interest in the guava has been stimulated by the work of Golberg and Levy (1940) who reported that firm ripe guavas contained the phenomenal quantity of 300 to 400 mg. ascorbic acid per 100 grs. fruit.

In 1942 Boyes and de Villiers made a valuable contribution by conducting a survey of the ascorbic acid values of different "guava types" in the Paarl area. They found that the ascorbic acid values of the "types" varied greatly, and also that the stage of ripeness influenced the ascorbic acid content and that there is an apparent correlation between the colour of the flesh and the ascorbic acid content of the fruit.

Webber (1942) reported that the ascorbic acid content of the guava varies considerably with variety and that it is not necessarily related to the colour of the flesh.

In order to elucidate the present unsatisfactory state of affairs in South Africa, a survey was conducted of some of the common varieties in the western Cape Province. It was possible to select standard material, as on some farms it has become common practice to propagate guavas from root cuttings, which ensures uniformity within the selected type. Of such uniform material, five varieties were selected and the survey conducted on them. The investigation dealt with the chemical changes during growth in these five selected varieties over a period of two seasons, namely 1942-43 and 1943-44, together with their description and standardization.

Description of Varieties.

Employing horticultural standards of growth and individual characteristics, such as time of ripening, size and shape of the fruit, colour of flesh, chemical characteristics, etc., the following selected varieties have been described:—

(1) *Early Red*.—This variety (Fig. I) is one of the earliest commercial varieties, and ripens at the end of March. It is a large fruit,



FIG. 1.—Early Red guava

slightly pointed at the stem-end and has a general pear-like appearance. The surface of the fruit is furrowed but smooth, while the flesh is firm and of a light salmon colour. It is sweet and slightly watery, has a pronounced guava aroma, and is relatively low in ascorbic acid. The whole crop ripens within 30 days, subject to climatic conditions, and is usually sold entirely for fresh consumption.

(2) *Madeira*.—The Madeira guava (Fig. 2) was the first to be introduced into South Africa and all our other varieties are selected hybrids of this variety.

This is a small to medium-sized fruit, slightly pear-shaped, but tending to be more round with a point at the stem-end. It has an uneven, smooth surface and the calyx is small. The Madeira has an outstanding guava aroma and flavour, is coarse in texture, and is generally regarded as being of inferior quality. The inner flesh is loose and cracked; in some cases the outer flesh and peel form a kind of shell around the inner flesh and pips, and this results in an unattractive canned product as the pips and inner flesh tend to separate, and the pack loses its uniformity. The colour of the fruit varies from a light pink to a yellowish pink, and the ascorbic content is low. The fruit ripens early in the season (from the beginning of April to June); the trees are good growers and produce large, regular crops.

(3) *Madeira Hybrid*.—This variety is a near relative of the Madeira and is very similar in shape and general uniformity. It is round with a slight point at the stem-end, the flesh has a light pink colour, the inner flesh is firm and compact, and in general this variety

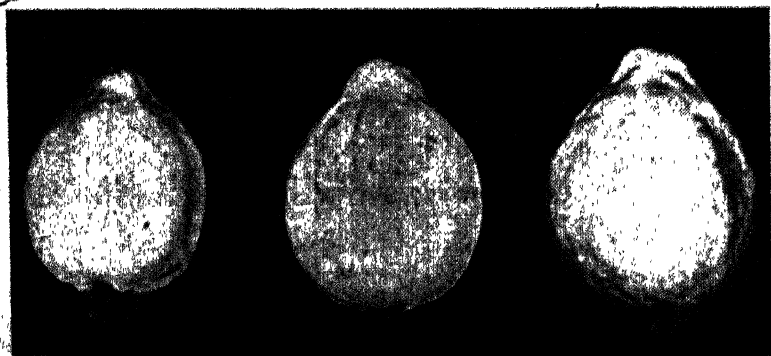


FIG. 2.—The Madeira guava.

is more palatable and richer in ascorbic acid than Madeira. A further difference is that it ripens a little later than the Madeira and also has fewer pips. The trees are very heavy bearers and the fruits ripen from the end of April to July.

(4) *Hugo Red*. (See Fig. 3).—The fruits ripen early in mid-season (May to September), are nearly round with a very short thick neck and the surface is smooth and even. It has a large open calyx and easily rots in this area. This variety is very easily bruised on account of its fine-grained texture and cannot be transported successfully over long distances, without being badly damaged. The flesh is firm and of a dark red colour, and the ascorbic acid content is high. The trees are vigorous, hardy and productive.

(5) *Salmonslei White Pear-shaped Guava*. (See Fig. 3).—This is a large pyriform, smooth or slightly ribbed guava, with a very small well-protected calyx. It has a small percentage of inner flesh and pips, and the outer flesh is very thick, firm and of a fine texture. The fruits are sweet and very palatable, with a delicate flavour. It is rich in ascorbic acid and ripens in midseason. The trees are rapid. Fig. 3.—From left to right: "Salmonslei White", "Fan Retief", "Hugo

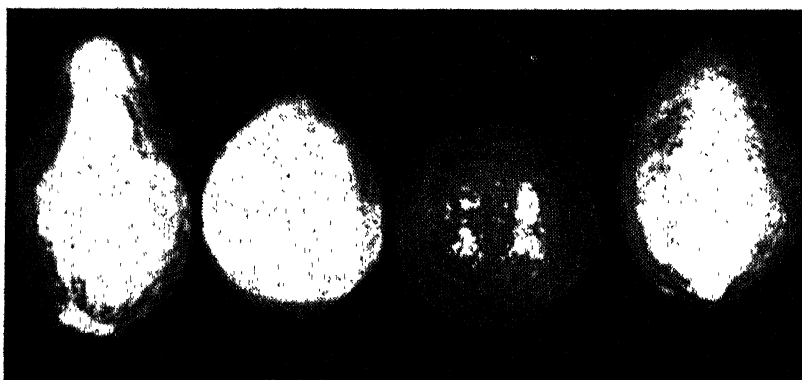


FIG. 3.—From left to right: Salmonslei White, Fan Retief, Hugo Red and Frank Malherbe.

vigorous growers and bear large regular crops. The colour of the fruit is greenish-white, which changes to a light cream when the fruit is very ripe.

(6) *Fan Retief*. (See Figs. 3 and 4).—This is the most common and popular variety in the western Cape Province and is generally favoured by canners. The fruit ripens from May to September, with a peak of ripening in the middle of this period. It is slightly pear-shaped with a tendency towards roundness, has a small calyx, and the flesh is firm with an attractive pink colour. This variety is slightly sour, and rich in ascorbic acid. When harvested in a fully mature but green-coloured condition, it can be successfully transported over long distances without being very badly bruised. On account of its firm flesh, it retains its shape very well when canned, and the inner flesh and pips remain firm and intact.

The trees grow vigorously and bear very heavy regular crops. The fruits of this variety are firmly attached to the stems and are not easily dropped from the trees or blown off by wind. Fan Retief has the advantage that the ripe fruits do not fall from the trees too soon, as is the case with some of the other varieties. This characteristic is very important, as it allows less frequent pickings.

(7) *Frank Malherbe*. (Fig 5).—This is a later variety than Fan Retief and ripens from July to November. The fruits are obovate-



FIG. 4.—"The Fan Relief" guava.

obtuse-pyriform, often with the sides unequal; the cavity is small, obtuse, shallow, russeted, furrowed and regular; the calyx is small and closed; the colour is lemon-yellow to deep yellow, marked with occasional patches of russet and with a faint russet-red blush; the flesh is dark red, firm, tender and melting when fully mature, juicy, rich and sweet. The quality is very good and it is the best eating and canning variety. The ascorbic acid content is very high and exceeds that of all other varieties. It has very few pips and the inner flesh is very firm.

The trees grow well in good soil and under favourable climatic conditions, but are not as vigorous and productive as Fan Relief trees. The ripening period is much longer than that of Fan Relief, and usually there is no peak ripening period.

(8) *Roussseau*.—This variety has much in common, as far as shape is concerned, with Frank Malherbe. The fruits are obovate-obtuse-pyriform, slightly russeted, and have numerous spots. The surface is smooth, the flesh red and thick and the inner flesh firm with few pips. The fruits ripen over a long period (from July to November), and are very uneven in growth. As soon as the fruits change in their ground colour, they drop from the trees and thus require daily harvesting. The fruits are sweet, rich in ascorbic acid and palatable. The trees are vigorous and fairly productive, but not to be compared with Fan Relief.

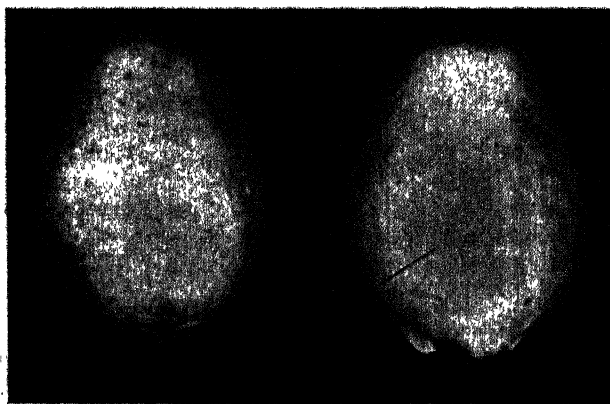


FIG. 5.—The "Frank Malherbe" guava.

Summary of Varietal Characteristics.

In Table I a summary is given of the general characteristics of the guava varieties described.

TABLE I.—*Characteristics of eight South African guava varieties.*

Variety.	Ripening Period.	Colour of Flesh.	Calyx.	Shape.	Vitamin C. content per 100 grs. fruit.
Early Red.....	March-May...	Salmon....	Small.....	Round pointed.	118.4 ± 24.02
Madeira.....	April-June...	Yellow-pink	Medium....	Round short neck.	153.8 ± 21.06
Madeira Hybrid...	Mid. April-July	Light pink..	Medium....	Round with point.....	280.0 ± 65.75
Fan Relief.....	May-September	Pink.....	Small.....	Obtuse-pyriform.	525.0 ± 117.15
Hugo Red.....	May-September	Dark pink..	Large.....	Round.....	508.0 ± 83.2
Salmonsvelei White	June-October.	White.....	Very small...	Pyriform....	541.0 ± 92.7
Rousseau.....	July-November	Dark pink..	Small.....	Obovate-obtuse.....	560.0 ± 74.8
Frank Malherbe..	July-November	Deep red...	Medium	Pyriform....	960.0 ± 213.0

From the descriptions given of the varietal characteristics it is clear that the complexity of the problem is such that no final descriptions can as yet be made, there being minor variations within varieties caused by peculiarities of the soil and climate of the particular areas. It has for instance been observed that one variety may have pear-shaped fruits at the beginning of the ripening period but that they become round towards the end of the season. Such changes have been observed on the same tree.

Ratio of Component Parts.

From the economic and processing points of view, the ratio of peel to flesh to the pulp and pips is of primary importance; the most favoured varieties are those with a small percentage of inner flesh and pips. Varieties having a large proportion of inner pulp and pips, are less suitable for canning, as this portion tends to separate during the processing, resulting in an unattractive pack which lacks uniformity. From both the eating and the dehydration point of view, varieties with a small percentage of pulp and pips are desired. In the process of preparation, prior to dehydration, the inner flesh and pips are removed and may be regarded as being preparation losses. Table II gives the ratio of peel to outer flesh to inner flesh and pips in eight guava varieties.

TABLE II.—*Ratio of peel: outer flesh: inner flesh and pips in eight guava varieties.*

Variety.	Percentage Peel.	Percentage Outer Flesh.	Percentage Inner Flesh.
Early Red.....	14.75 ± 2.419	46.5 ± 5.25	38.5 ± 2.953
Madeira.....	16.60 ± 2.825	43.5 ± 2.39	37.5 ± 3.537
Madeira Hybrid...	16.75 ± 2.915	52.5 ± 6.28	33.0 ± 2.836
Fan Relief.....	13.50 ± 2.661	57.0 ± 3.183	29.0 ± 3.298
Hugo Red.....	14.75 ± 1.131	44.0 ± 3.912	40.5 ± 2.910
Salmonsvelei White.	13.50 ± 2.101	62.0 ± 3.719	23.0 ± 2.26
Rousseau.....	17.25 ± 3.091	55.5 ± 8.673	29.0 ± 6.316
Frank Malherbe...	13.50 ± 2.037	63.0 ± 4.568	23.0 ± 4.378

From Table II it is evident that this varietal characteristic is of primary importance and demands consideration in the selection of guava varieties.

Chemical Compositions and Changes during the Final Ripening Period.

After having reached full maturity the fruits tested were harvested in three stages of ripeness, which may be described as follows:--

Stage I.--Fully mature, smooth, whitish green and hard, with a penetrometer reading of 14-22 lb. per $\frac{3}{8}$ inch bit.

Stage II.--Smooth, half ripe and firm, of a yellowish-green colour, and a pressure of 6-10 lb. per $\frac{3}{8}$ inch bit.

Stage III.--Fully ripe and soft guavas, of a golden yellow colour, and a pressure of 4-6 lb. per $\frac{3}{8}$ inch bit.

In the maturity tests, fruits were harvested at the above stages, in order to determine possible chemical changes during the final ripening period.

The ripening processes of fruits are characterized by various changes, which are of a chemical, physiological and physical nature. The amount of pleasure derived from eating a fruit may be determined largely by the physical nature of the cells of that fruit. As the cells of some fruits enlarge, the walls tend to become thinner and any influence that causes the cells to become still larger, may cause the walls to become thinner than the cell walls of fruits growing under less favourable conditions. The composition of the cell walls has much to do with their firmness or tenuity when the fruit is ripe. In most fruits the cell walls are composed of cellulose and insoluble protopectin, which, when the fruit ripens, is changed to soluble pectin. This leaves the walls very thin and fragile, so that they easily become ruptured and release their juices into the spaces between the cells, which gives the fruit an increased juiciness and pleasant melting texture, but causes it to be highly perishable.

Many substances contribute to the flavour of fruits. Those which usually dominate in giving flavour and which are present in large enough quantities to be determined by analysis, are sugars, acids and to a lesser extent organic esters and astringent substances, such as tannin compounds.

The pronounced flavour of the guava varies with the different varieties and develops to a maximum extent in fully ripe fruits. Fully mature, but green, guavas are hard and unpalatable, due to a pronounced astringency. The amount of tannic compounds is much greater in the juice of green, than in ripe fruits. The moderate astringency in the ripe guava gives it a pleasant sprightliness. The aroma of the guava is supplied by odorous constituents which develop simultaneously with the final colour changes.

The green colour of the immature guava is due to the chlorophyll. As this decreases during ripening, other colours which have not been clearly visible, come to the fore. In the guava, colour changes take place very rapidly. In some cases it has been observed that in fully mature, but green, fruits, the outer flesh has a whitish-green colour, which changed to a light pink within twenty-four hours. This appears to happen with great ease when the green fruits are subjected to warm, humid conditions.

In other yellow fruits, the colour may be given in part or entirely by carotenoid compounds, such as carotene and xanthophyll. In the guava, however, the amount of carotene is relatively small and the colour is largely due to xanthophyll and flavone compounds. These pigments are also dissolved in the juice of the guava. The slight red or pink colour in the skin of some varieties is due to different anthocyanins which are dissolved in the cell sap.

GUAVA VARIETIES IN SOUTH AFRICA.

A further important change which takes place in the ripening guava, is the rapid decrease in pressure. This decrease in pressure appears to be related to the eating qualities of the fruit.

Table III gives the mean values of various chemical constituents, as determined during each variety's respective ripening season. The mean values were obtained from at least ten sample replicates.

TABLE III.—*Chemical and varietal differences of guavas.*

Observation.	Early Red.	Madeira Hybrid	Madeira.	Fan Retief.	Frank Malherbe.	Rousseau.
Growth period, in days.....	115-130	180-200	180-200	200-240	260-280	240-270
Maximum rate of weight increase mgs./day/fruit....	4.8	3.6	3.05	3.05	1.88	1.85
Maximum rate of Vitamin C. increase mg./100 grs.....	1.179	1.77	1.123	2.04	2.88	2.07
Average weight at maturity, grs.....	76.32	86.97	78.6	82.21	91.8	79.06
Average diameter at maturity, cms.....	5.13	5.4	4.9	5.5	5.32	5.24
Soluble solids at maturity, percentage.....	10.1	10.52	9.77	11.4	10.0	10.08
pH at maturity	4.81	4.98	4.344	4.050	4.211	4.13
Vitamin C. at maturity mg./100 grs.....	118.4 ± 24.02	280.0 ± 65.7	153 ± 21.06	525 ± 117.2	980 ± 213	560 ± 74.8
Fructose at maturity, percentage.....	6.24	5.62	4.76	5.08	4.40	4.85

TABLE IV.—*Chemical analysis of stage I, II and III of guava varieties from one locality.*

Variety.	Stage.	Juice per 100 grs. fruit.	Soluble solids.	pH.	Vitamin C. per 100 grs. peel.	Vitamin C. per 100 grs. flesh.	Vitamin C. per 100 grs. inner flesh.	Vitamin C. per 100 grs. fruit.
Early Red....	I	37.75	9.10	4.38	239.88	157.53	35.02	115.94
	II	37.50	9.60	4.45	263.44	136.26	35.99	120.29
	III	40.88	10.10	4.81	276.26	133.31	35.60	117.04
Madeira Hybrid	I	23.00	9.10	4.823	371.68	249.31	57.56	205.18
	II	33.00	10.38	4.815	352.08	209.81	42.70	179.41
	III	36.00	10.52	4.98	280.23	168.28	45.37	149.06
Madeira.....	I	29.13	9.20	4.14	209.43	120.33	46.05	105.39
	II	38.75	9.90	4.22	238.80	132.62	51.81	117.82
	III	34.88	9.23	4.627	247.43	125.87	47.91	118.88
Fan Retief....	I	39.33	8.55	4.354	764.54	609.01	313.09	541.83
	II	40.17	9.72	4.060	701.50	552.20	288.79	496.19
	III	36.88	9.90	4.02	899.77	648.67	356.29	580.92
Frank Malherbe	I	41.00	9.2	4.22	1,421.65	1,071.08	716.14	1,041.76
	II	39.00	10.6	4.15	1,510.92	1,213.75	790.08	1,136.89
	III	38.00	11.2	4.09	1,483.30	1,162.65	741.38	1,114.71
Rousseau.....	I	48.00	9.83	4.288	858.00	613.74	297.07	560.08
	II	37.00	10.08	4.084	845.6	633.65	336.88	585.14
	III	30.75	10.70	4.110	934.8	711.81	384.34	660.82

From Table IV it is clear that, except for the changes previously mentioned, there are only very slight variations in the different determinable constituents during ripening.

In the early and midseason varieties, e.g. Early Red, Madeira Hybrid, Madeira, and Fan Retief, there is a slight increase in the amount of expressible juice. For all the varieties investigated, there tends to be a slight increase in the soluble solids as the guava passes from hard green to soft ripe. As far as could be determined, the changes in fructose were negligible during this period and the slight changes which were observed, together with pH changes, could be divided into two groups, depending on when the fruit ripens in the season. In the early varieties, there was a slight increase in the pH value and an apparent decrease in fructose; in the later varieties, this condition was reversed.

Golberg and Levy (1942) stressed the importance of maturity of the fruit on the ascorbic acid content and stated that "as the fruit ripens, the vitamin content increases until the maximum value is reached, then appears to decrease until in over-ripe soft guavas, only a portion of the original vitamin remains".

Boyes and de Villiers (1942) made similar statements in regard to the influence of ripeness on the vitamin C content of the guava. The results obtained in this investigation, over a period of two years, proved the contrary.

Ascorbic acid develops in the immature fruit (de Riche 1945), but no significant ascorbic acid development could be detected after the fruit has reached full maturity. The ascorbic acid values of the three stages (Table IV) prove that the changes are insignificant for the ripening fruits. The existing variations may be sampling errors, which are inevitable, and an important factor in the work of Boyes and de Villiers, due to the fact that their analyses were not conducted on selected, uniform, standard varieties, from the same trees, every time.

In general it was found that the major physical and chemical changes in the guava take place during the growth and development of the immature fruit. When full maturity is reached, the guava only passes through the necessary changes to make it edible. These are confined to slight changes, as indicated, in the sugars, acids and flavour-giving compounds and not to ascorbic acid as previously reported by the workers mentioned above. They also reported that within the types investigated by them there appeared to be a definite increase in the ascorbic acid content, through the run of the season. The results of the present investigation proved that, although a variety may ripen over a period of one to two months, no significant increase within a variety could be detected.

TABLE V.—*Effect of over-ripeness of guavas on ascorbic acid.*

Stage.	PERL.		OUTER FLESH.		INNER FLESH.	
	M.	σ	M.	σ	M.	σ
I.....	990	157.3	711	43.5	371	50.0
II.....	954	115.0	713	32.5	397	62.3
III.....	962	104.5	699	92.0	428	36.5
IV.....	1,044	75.6	778	29.0	349	27.5

(σ = Standard deviation).

During both seasons of this investigation guavas in all stages of maturity and ripeness were studied. The above-mentioned workers claimed that ascorbic acid was disintegrated in over-ripe fruits, this subsequently causing a rapid decrease in the total concentration.

Guavas of maturity stage IV (Table V) were guavas which had become fully ripe on the trees and had eventually dropped to the ground. They were of a very dark yellow colour, and very soft, with a pressure-reading below 2 lb. per $\frac{3}{8}$ inch bit. The flesh of the guavas had lost its firmness and was a pulp. In no case were fruits with injured surfaces included. The results were calculated from seven replicates of one variety harvested from the same plot.

The results indicated that very soft ripe guavas, generally referred to as being over-ripe, contained as much ascorbic acid as the hard, firm fruits. The low values obtained by other workers may have been due to the inclusion of broken or decaying fruits in their samples.

Summary and Conclusions.

(1) A survey of the available literature on guavas has been discussed.

(2) Eight varieties have been described and full analyses of six given.

(3) The influence of the stage of ripeness on ascorbic acid development has been discussed.

(4) Results have proved that over-ripeness has no effect on ascorbic acid content of sound fruits.

LITERATURE.

- BOYES, W. W. AND DE VILLIERS, D. J. R. (1942)—"Vitamin C content of guavas". *Farming in S.A.*, Vol. 7, 1942.
- GOLDBERG, L. AND LÉVY, L. F. (1942)—"The Antiscorbutic value of Guavas" *J. of S.A. Chem. Inst.*, March, 1942.
- LE RICHE, F. J. H. (1945)—Unpublished Thesis on "Development and Processing of Guava Varieties".
- MILLER, C. D., BAZORE, K. AND ROBBINS, R. C. (1936)—"Some Fruits of Hawaii, and their composition, nutritive value and use". *Hawaii Agric. Exp. Station Bull. No. 77*.
- STENNER (1931)—"Commercial use of Guavas". *Florida State Dept. Agric. Bull. No. 50*.
- THURSBY (1932)—"The use of Guavas in Household Menus". *Florida Ext. Ser. Bull. No. 70*.
- WEBBER, H. J. (1942)—"Extending guava production to California". *Proc. of the Am. Soc. Hort. Sc.*, Vol. 41, p. 228.

Guaranteed Seed.

Sellers of lucerne, teff, rye-grass, Rhodes, *Paspalum* and *Phalaris* grass seeds are reminded that in terms of the requirements of the "Seed Act" No. 21 of 1917, the purity and germination capacity of these seeds must be stated in advertisements and also be given on labels attached to containers when declared seed is offered for sale.

In terms of section 8 (f) of the Weeds Act, No. 42 of 1937, it is necessary to state that lucerne seed is free from dodder seed, and that teff and rye-grass seed is either free from nutgrass (vuintjie) and sheep sorrel seed, or that they do not contain more than $\frac{1}{2}$ per cent. of these proclaimed weed seeds.

Further particulars and copies of the relevant regulations are obtainable from the Seed Analyst, c/o College of Agriculture, Potchefstroom.

Spraying Citrus Trees for Mineral Deficiencies :--

[Continued from page 8.]

zinc deficiency the following spray formula has given good results: 10 lb. of zinc sulphate (23-25) per cent. zinc) plus 5 lb. hydrated lime in 100 gallons of water (4 to 6 gallons per tree). Trees should, however, never be allowed to get into such a state that corrective sprays are necessary. In areas where a zinc deficiency is known to exist, citrus trees should receive a zinc spray regularly. The following formula is recommended: 4 lb. of zinc sulphate plus 2 lb. hydrated lime in 100 gallons of water. An application once every two years is usually sufficient.

Time of Application.

The sprays may be applied any time of the year, and the quickest results are obtained just before a growth flush. If scale infestation is severe, the spray should be applied after fumigation as the residue might act as a protectant for the scale. Otherwise the best time for spraying is shortly after the fruit has been picked so that no trouble in removing spray residue from the fruit need be experienced. Conventional spray equipment may be used to apply the sprays, and the object to be aimed at is to let all the leaves on the tree receive a little of the spray. It is not necessary that every leaf be completely covered and heavy rates of application have no greater effect than light ones.

Deficiencies of magnesium, manganese, and copper have been found in citrus soils in the Union, but to a much lesser extent than in the case of zinc. Magnesium and manganese deficiency cause the leaves to develop characteristic types of chlorosis, while the best indication of copper deficiency is the formation of gum pockets in the fruit and young twigs. Cures may be effected by soil or spray applications of compounds containing these elements. Spraying usually gives much quicker results than soil applications and since the various elements, including zinc, can be combined in one spray, growers are advised to consult the nearest Government Horticulturist when deficiencies of the above-mentioned minerals are suspected.

The 20 per cent. Commission to Agricultural Societies.

In the hope of also promoting organization amongst farmers by this means, the Department allows a commission of 20 per cent. on the 5s. subscription to *Farming in South Africa* where it is forwarded by the secretary of an agricultural society.

The scheme is briefly as follows: A member of an association hands his or her 5s. to the secretary, who then sends only 4s. to the Government Printer, together with an official receipt bearing the name and address of the subscriber, period subscribed for, etc., and signed in his official capacity by the secretary of the association, otherwise the Government Printer will not accept the subscription under this scheme. The costs involved in the despatch of the 4s. must be paid out of the 20 per cent. commission.

Under the term "agricultural associations" are included farmers' associations, women's agricultural associations, co-operative societies, egg circles, poultry clubs, home economics branches, and the like.

Veld Management in the Southern Transvaal and North-Eastern O.F.S.

R. E. Foster, Leeuwkuil Pasture Research Station, Division of Soil and Veld Conservation.

THE predominant grass occurring in the natural veld in this area is "rooigras" (*Themeda triandra*), but it is the other constituents of the sward that usually determine the character of the pasturage and, consequently, the method of management to be applied.

For want of better names these different types of natural veld are usually designated "sour", "sweet" or "mixed", and it will be advantageous to treat them individually.

(1) Sour Veld.

Various veld types are called "sour" and often the only characteristic they have in common is that they are not readily eaten by stock when in the mature state. Typical sour veld occurs on the quartzite soils in the vicinity of Johannesburg and westwards towards Krugerdorp and Randfontein. The soils are mostly of a poor, sandy nature and the vegetation consists of coarse tufted grasses. Rooigras is present, but it occupies a minor position. Dominance is shared by such sour grasses as *Trachypogon plumosus*, *Tristachya hispida* (rooisadgras), *T. rehmanni* (besemgras) and *Elyonurus* (suurpol). When in the immature state during early spring or when kept closely cropped, these grasses are eaten fairly readily by stock. It is for this reason that these veld types are most susceptible to destruction. The areas on which they occur are usually very stony, and to get rid of the mature and unpalatable grass one has to resort to fire. The young grasses are then grazed as soon as they appear through the burn, and they are kept short throughout by constant grazing.

If the animals which are run on a piece of veld are not sufficient to keep the whole area closely cropped, then certain zones, where the grasses are most palatable, are grazed and the remainder is allowed to become old and coarse. As the growth rate diminishes, these selected areas are not sufficient to maintain the animals, and severe over-grazing takes place on an apparently lightly-grazed area. It is clear, therefore, that too light stocking of this veld type is almost as destructive as over-grazing.

To overcome this danger of selective grazing it is necessary to graze the veld severely for a period, and then allow it to recover by giving it a rest. In this way all grasses are cropped and kept at a more or less even state of maturity. To achieve this it is of course necessary to subdivide and graze the camps in rotation. During summer, when growth is rapid, it will not be possible for the animals to cope with the grass produced unless their number is increased. This will mean decreasing the number again when the growth-rate diminishes or else destruction of the veld will occur. As this practice is impossible on most farms, some other arrangement must be made. Certain camps that can be mown, must be selected and protected from grazing during this period and then mown for hay when the grass is sufficiently long. In this way the concentration of animals is increased on the remaining area and selective grazing avoided. At the same time the veld benefits from the rest and mowing.

Where only a small area can be mown, due to the presence of stones, etc., on the remainder, it will not be possible to rotate the

grazed and mown camps, but where this is at all possible it is very desirable, as most of the best grasses benefit from the rest and a large number are able to shed a great deal of seed before they are mown. This seed assists in re-establishing and improving the constitution of the sward.

Winter production on this sour veld is impossible unless provision is made for stock feed in the form of hay and/or silage. As mentioned previously, the surplus grass produced during summer can be turned into hay and fed in winter, or hay can be made from established hay fields. The yield of hay from natural veld is usually rather low, but in considering this practice it must be borne in mind that the mowing not only yields a palatable feed for winter use, but also improves the grazing. No matter how sour and unpalatable the grass might be in its fresh state, it is readily eaten when cured as hay.

Large areas of so-called sour veld occur throughout this region, but this "sourness" has developed largely as a result of mismanagement. Especially in the grain-producing areas there are many old maize lands which have been allowed to lie fallow and have passed through the "sweet" stage when annuals and "kweek" are the predominant grasses to the "sour" stage when "steekgras" (*Aristida* sp.) and "tanipol" (*Eragrostis*) occupy the dominant position.

These old lands can be utilized for summer grazing during the period October to March, but during the remaining six months, which can be divided into three periods, supplementary feed must be provided. From April to mid-May specially produced grazing must be provided. This grazing can consist of a mixture of an annual grass and a legume, or preferably of a mixture of grasses and legumes with a perennial tendency. This will reduce the amount of ploughing and cultivation required to produce the grazing. Where the soils are not too exhausted and not too shallow, dryland lucerne can play an important part in enriching the grazing used for this purpose. During the second period, namely from mid-May to the end or middle of August, depending on the climatic conditions, the animals must depend almost entirely upon supplementary feed, preferably in a kraal where the dung and urine can be used for the production of compost. The third or early spring period, namely from about the middle of August to the end of October, is usually the most critical. It is at this stage that conserved feed begins to run short and the animals no longer eat it with relish, having tasted the green grass beginning to grow with the first rise in temperature. If the condition of the animals is to be maintained, it is essential that they should have access to some high-quality grazing at this time.

The natural veld or old-land vegetation is not sufficient during early spring, as growth at this time of the year is too slow to provide the animals with adequate nourishment, and use must be made of perennial grasses or established mixtures. Absence of winter rains makes it impossible to grow winter grasses for this purpose and use must be made of fodder plants that commence vigorous growth early in the season. Few grasses do this, especially grasses which are easily established from seed, but an excellent mixture has been found to consist of lucerne and *Paspalum*. After the spring grazing has taken place, the area can be reserved and a hay crop cut from it. It is on areas such as this that compost, produced in the kraal during winter feeding, can be used in large quantities and to great advantage.

Such an area will remain in a productive state for three or more years after which it can be ploughed over and rotated with the areas used for producing the winter feed.

Another artificially produced sour veld frequently occurs in the eastern Orange Free State in the Bethlehem and surrounding districts. This veld type was originally mixed, consisting mainly of rooigras, but containing a proportion of sour, tufted grasses such as "suurpol" (*Elyonurus*). Continuous grazing of this veld type led to the extinction of the palatable grasses, while the sour types developed and spread as a result of the unrestricted production of seed.

It is comparatively easy to improve and sweeten sour veld of this nature by practising a system of rotational grazing accompanied by hay-making where this is at all possible.

(2) Sweet Veld.

Very little true "sweet" veld occurs in this area, as by this term it is implied that the grasses constituting the sward retain their palatability in the mature state and are grazed by stock even during the winter months. The annual grasses such as "soetgras" (*Panicum laevifolium*) and wild millets (*Staria sp.*) constituting the cover on a recently fallowed land are commonly called sweet grasses and consequently the grazing provided by them is called sweet veld. Unfortunately this stage does not continue for long. The annual grasses last only one or two years and even the "kweek" which follows them is replaced by "steekgras" and other inferior grasses after five or ten years, depending upon the nature of the soil. When this change occurs, the sweet veld becomes sour veld.

In certain parts of the country, and especially along water courses where thorn scrub occurs, a true sweet veld is encountered. The grasses here consist largely of "buffelsgras" (*Panicum maximum*) and finger grasses (*Digitaria spp.*), and they supply valuable winter grazing. Care should be taken that such veld is not damaged by over-grazing or fire, and it will greatly repay lenient treatment. Due to the grazing available at the time of scarcity and the protection from cold offered by the thorn scrub, it is all too common to see such areas damaged beyond recovery.

(3) Mixed Veld.

The greater part of the area concerned is covered with a mixture of sweet and sour grasses and the predominance of one or the other depends largely upon the treatment the veld has received.

To maintain animals in good condition on this veld type throughout the year it is essential that hay be made from the veld for feeding during winter. Also, since sour grasses are present in appreciable quantities, it is necessary to graze severely during summer to avoid selective grazing and consequent destruction of the more palatable grasses and the increase of the undesirable types. To achieve this it is necessary to subdivide the grazing area, and from experience it has been found that three areas of equal size are required for each herd. Calling these areas A, B and C, their treatment is as follows:—

Camp A is grazed in summer, commencing immediately the grass has begun vigorous growth and continuing until growth has become so retarded that the sward will suffer if grazing is continued. Camps B and C are reserved during summer and are mown for hay which is stored for winter feeding.

When camp A can no longer support the animals at the end of summer, they are removed to camp B where they graze upon the aftermath growth that has taken place after the removal of the hay crop. As the winter progresses, it will be necessary to feed the hay to the animals, and it has been found that scattering the hay over various parts of the camp is preferable to feeding in a hay-rack in one place. The cover is not damaged, as would happen if the animals are concentrated at one point, and the seed present in the hay is distributed over the camp and has a chance of germinating and re-establishing the sward.

Towards the end of winter, when slow growth has commenced, camp B will no longer be able to provide sufficient grazing for the animals, and it will be necessary to transfer them to camp C where they continue to be fed hay. The animals remain on this camp until vigorous growth has commenced, when they are again removed to camp B which becomes the summer grazing camp, and camp A is reserved for a hay crop. This rotation is repeated each year with the result that each camp is grazed once in the summer and mown twice in a cycle of three years. The carrying capacity of the veld under this system is three and two-thirds (3 $\frac{2}{3}$) morgen per head of cattle.

When it is necessary to maintain two separate groups of animals, such as lamels and ewes, the above system can be followed, but it is more economical to use only five camps instead of six.

Calling the two classes of animals A and B, and the camps numbers 1, 2, 3, 4 and 5, and commencing with the summer period, A is grazed on 1, and B on 2 for the whole of the summer. Camps 3 and 4 are reserved for hay production and camp 5 is rested to produce a good seed crop. It also serves as a buffer in case of a bad year when less intense grazing is required. During the winter, camps 3 and 4 are grazed and the hay cut from them is fed to the grazing animals. Each year the camps are rotated according to the plan given below:—

	Camps.	1	2	3	4	5
1945	Summer.....	Graze	Graze	Hay	Hay	Rest.
	Winter.....	Rest	Rest	Graze	Graze	Rest.
1946	Summer.....	Hay	Hay	Rest	Graze	Graze.
	Winter.....	Graze	Graze	Rest	Rest	Rest.
1947	Summer.....	Rest	Graze	Graze	Hay	Hay.
	Winter.....	Rest	Rest	Rest	Graze	Graze.
1948	Summer.....	Graze	Hay	Hay	Rest	Graze.
	Winter.....	Rest	Graze	Graze	Rest	Rest.
1949	Summer.....	Hay	Rest	Graze	Graze	Hay.
	Winter.....	Graze	Rest	Rest	Rest	Graze.

In this system each camp gets a full year's rest once in five years and its vitality is thereby greatly increased.

Established Pastures.

The area concerned has been extensively ploughed for the production of grain, and consequently has many abandoned old lands which have been allowed to lie fallow because they were either no longer needed or because they became too exhausted to produce a satisfactory grain crop.

The suitability of the grazing yielded by these fallows depends largely on the state of fertility of the soil, and upon the age of the fallow. Generally the older the fallow, the more inferior is the

grazing until the stage is reached when the natural veld grasses commence to return. Unless the fallow is specially treated by manuring and seeding, this stage is generally reached only after thirty or forty years.

It is obvious, therefore, that established pastures would be of inestimable value in this area, and several attempts have been made to establish different grasses, but with little success. These artificially established pastures, consisting of a single grass or a mixture of grasses collected in different localities and selected on account of one or other desirable characteristic, often do exceptionally well during the first, and in some cases even the second, year after establishment. After this they invariably deteriorate so badly that they practically disappear, and at best yield only meagre grazing.

Owing to this rapid deterioration of established pastures more attention has been paid to those grasses which are most easily established from seed, as the cost of planting roots is excessive when the life of the resulting pasture is considered. It is realized, however, that many of the grasses propagated from cuttings or roots are greatly superior to these in so far as their ability to withstand adverse conditions is concerned.

At this stage it cannot be recommended that natural veld in a vigorous state be ploughed for the purpose of establishing a pasture. The veld is at least permanent, no matter what other limitations it might have, whereas the established pasture is in no way permanent and soon becomes inferior to the original veld in so far as productivity is concerned.

It is therefore only on old lands that attempts should be made to establish pastures, but as the soils of these areas are usually exhausted and very poor in organic matter, it is essential that this constituent of the soil be increased. Green manures can be used for this purpose, but it is much more satisfactory to apply compost, the making of which should be part of the routine on every farm in this area. Large quantities of compost, up to ten tons or more per morgen, must be used, but its application to the soil not only means an increase in the yield of herbage, but often determines the success or failure of the establishment of the pasture.

Under these conditions it is obvious that artificial pastures cannot be grown extensively, but their main function is to supplement the veld during seasons of deficiency, and as such only small areas of high quality pasturage are required.

Since so much care must be taken to ensure the success of the undertaking, it is necessary that only the very best grasses and fodder plants be selected for establishment. The conditions prevailing will restrict one's choice of grasses, but the inclusion of a legume in the pasture is very desirable both from the point of view of improving the soil and increasing the nutritional value of the herbage. Lucerne has not received the attention it deserves in this respect. Given suitable conditions, it will more than justify its inclusion in the pasture. The yield under dry-land conditions might be very low when compared with what is obtained from irrigated lucerne lands, but the mere presence of lucerne is of value as it gives that extra quality that is so needed in a grazing or hay field.

Turkish Tobacco*.

H. L. Strydom, Tobacco Officer, Stellenbosch-Elsenburg College of Agriculture.

TURKISH TOBACCO is grown mainly in those regions bordering on the Eastern Mediterranean and the Black Sea, Greece and Turkey being the principal producing countries. Apart from the Near East, the only other regions where Turkish tobacco is as yet cultivated on any appreciable scale are the western Cape Province and Southern Rhodesia.

Turkish tobacco is a small-leaf type with a distinctive flavour and aroma which make it eminently suitable for the manufacture of cigarettes, and is consequently used exclusively for this purpose in blends with Virginia tobacco. The annual production of Turkish tobacco in the Union is approximately three-quarter million lb. and the marketing of the crop offers no difficulties.

Climate.

Turkish tobacco grows best in areas, with a high rainfall during the months immediately preceding planting time. During planting time and the following few months, the rainfall should be just sufficient for the normal development of the plants. As soon as the leaves begin to mature and are ready for picking, warm and dry weather is required.

Soils.

It is of the utmost importance that Turkish tobacco should be planted only in soil to which it is suited. Grey sandy loam soils are eminently suitable for Turkish tobacco and produce the best quality tobacco when they have been derived from granite. During dry seasons, our red loamy soils also give good results. Clay and chert soils should be avoided.

Seed Beds.

A plentiful supply of sturdy and healthy plants is a primary prerequisite of a successful tobacco crop. The site selected for the seed beds must be well protected against prevailing cold winds and should receive the full benefit of the sun, more especially the early morning sun. Low-lying and badly-drained sites should be avoided.

The soil should be cleared in good time and a thick layer of stable manure incorporated. Just prior to sowing time the soil should be dug over once more. The site is then divided into beds, 3 ft. wide, with a footpath, 1 foot wide, between them. To ensure good drainage, the beds are made a few inches higher than the footpaths.

After the beds have been laid out, a thick layer of vine prunings or similar firewood is spread over them and set alight, the object of the burning being to destroy weed seeds, insects and disease organisms.

After the soil has cooled down, as much of the ash and other residue as possible should be removed; the soil is then brought to a fine state of tilth and the surface made as level as possible, after which the seeds are sown. The rate of seeding is approximately 1 oz. per 60 square yards, or one heaped teaspoonful per 10 square yards. In order to spread the seed uniformly, it is necessary to mix it with fine material such as sand or ash. After the seeds have been sown, a thin layer of fine, sifted and well-rotted stable manure is spread

* Short Resumé of Bulletin No. 244, "The Production of Turkish Tobacco in the Western Cape Province" (by H. L. Strydom, Tobacco Officer, Stellenbosch-Elsenburg, College of Agriculture).

over the beds and carefully watered. The beds must be watered and weeded regularly.

If open beds are used the best time for sowing is towards the end of May. In cases where the beds are covered with cheese cloth, the seeds may be sown three to four weeks later.

Earth fleas sometimes cause serious damage to newly-germinated plants, and it is therefore advisable at this stage to treat the seedbeds regularly with nicotine sulphate. Lead arsenate powder is used for the control of insects which bite off and swallow parts of the plant.



A field of Turkish Tobacco partly harvested.

Wildfire (Bacterium tabacum) is a dreaded disease which sometimes causes very serious damage. It may be controlled by regularly spraying the beds with Bordeaux mixture.

Slow growth and a yellow discoloration in plants are frequently signs of a nitrogen deficiency. Such plants will recover rapidly if a solution of two tablespoons of ammonium sulphate in 4 gallons of water is poured over every 10 sq. yds. of seed bed. To guard against scorching, the plants should immediately be rinsed off with clean water.

Preparation of the Soil and Fertilization.

Turkish tobacco requires thorough cultivation of the soil. The soil is ploughed at least three times and brought to a fine state of tilth before planting time. Where karroo manure is applied, it must be incorporated after the first winter rains at the rate of 2 to 4 tons per morgen. Just before planting time it is supplemented with 400 lb. superphosphate and 100 to 150 lb. ammonium sulphate per morgen. If no karroo manure is applied, a mixture of 600 lb. superphosphate and 200 lb. ammonium sulphate and 200 lb. potassium sulphate may be applied per morgen.

Transplanting and Cultivation.

The plants are transplanted in September in rows 2½ ft. apart with an espacement of 6 to 8 inches in the rows. On soils where the

plants are inclined to grow too large and coarse, the spacing may be somewhat closer, and on poorer soils, wider.

Where resetting is necessary, it should be carried out as soon as possible after transplanting, otherwise the stand will be uneven and harvesting will be exceedingly difficult.

About two weeks after transplanting, the soil around each plant should be thoroughly loosened with a hand hoe. After this the soil is cultivated with a "Planet" after each rain to keep it loose and to destroy weeds. This treatment is repeated until the plants are so large that further cultivation would involve the danger of the leaves being damaged.

Harvesting and Curing.

About a week before the first leaves are harvested, the four lowest leaves (sand leaves) which have a negligible market value, should be removed.

The remaining leaves are ready for harvesting as soon as they assume a yellowish tint. Generally about four leaves per plant are harvested at a time. About seven pickings are therefore necessary to strip the plant of all its leaves. The classings are as follows. (1) Bottoms, (2) First middles, (3) Second middles, (4) Third middles (2 pickings), (5) Ootsh Alti (under top leaves, and (6) Ootsh (top leaves). These pickings differ in quality and must be kept strictly separated. The bottom leaves are usually large, thin, and lacking in flavour or aroma. The top leaves, on the other hand, are thick-bodied, fragrant and pleasing to the taste.

The leaves are picked in the morning, packed in boxes and removed to a cool shed where they are classed according to size and then strung onto flat needles.

Broken and over-ripe leaves are strung separately. As soon as there are enough full needles of one class, the leaves are slipped off the needles onto a piece of twine which is fastened to a 6½ ft. reed. Four needles of leaves will generally go onto one reed.

From the stringing shed the reeds with leaves are taken to a wilting room where they are hung over cross-beams. The room should be so constructed that it can be well ventilated. The object of the wilting room is to keep the leaves in a comparatively fresh condition for a few days so that the desired changes in the leaves can take place normally.

The optimum temperature for the yellowing and wilting of the leaves is usually from 70° to 80° F., with a relative humidity of about 80 per cent.

The reeds are left in the wilting room until the leaves begin to assume a yellow tint. From the wilting room the leaves are taken to the drying camp where they are hung up on racks. The leaves are covered on the first day, but from the second day onwards they are left exposed and covered every night or during rainy weather only.

As soon as the midrib of the leaves is half dry, the reeds are removed from the rack and laid on hessian on the ground. The reeds are turned every day until the midrib is quite dry.

Treatment After Curing.

During the night the cured tobacco usually absorbs moisture which renders the leaf tissues soft and pliable. If the tobacco is in this condition in the morning, it is removed from the drying camp and packed on a low platform in a cool shed. The stack must be examined regularly and if heat is being generated, the tobacco must immediately be re-stacked in order to obviate damage to the leaves. Normally, the re-stacking should be carried out every few weeks.

The Dry-Lands Problem in the North-Eastern Cape Province.

C. E. M. Tidmarsh, Pasture Research Officer, Grootfontein College of Agriculture, Middelburg, Cape.

THE decline in fertility and depletion of soils subjected to annual cultivation under dry-land conditions is a matter which, in recent years, has figured prominently in the investigations and agricultural literature of various countries. The problem is particularly acute in South Africa, especially in areas of summer rainfall with approximately 20 to 30 inches per annum. The damage done by the annual use of the plough in these areas where high summer temperatures prevail, is largely due to the rapid destruction of the organic matter in the soil by oxidation, induced by greatly increased aeration of the soil, with consequent destruction of soil structure and fertility. Since considerable publicity has, however, of late been given to this aspect of the matter it will be the object of this article rather to discuss some practical measure, that may be applied with advantage in areas such as the north-eastern Cape Province and particularly the district of Aliwal North.

In temperate and dry temperate regions, with high summer temperatures and summer rainfall, the rate of destruction of organic matter through oxidation, in well aerated soils, is normally greater than its rate of formation, and the accumulation of humus in such soils is consequently minimal. In such regions the most practical and effective method of increasing and maintaining the humus-content of soils is the establishment of perennial vegetation, and especially a grass sward. A dense grass cover not only supplies large quantities of raw organic matter but also reduces summer soil temperatures and aeration, increases the retention of moisture in the soil, and thus provides the required conditions for humus accumulation. Broadly, then, the salvation of our dry arable soils is to be sought in the establishment of perennial fodder crops and pastures (leys).

Suitable Perennial Pasture and Fodder Crops.

Since the farmer is dependent upon his land for a livelihood and cannot therefore devote all his time solely to the rehabilitation of his soil, he must ensure that the inclusion of perennial leys in the farming system will not only enhance the fertility of the soil but also give the requisite remuneration. The aim of any investigation therefore must be to test and select suitable perennial pasture and fodder crops, and to examine how these may be best included in the general farming system to conform to the above-mentioned requirements.

At the outset this will necessitate revision of the whole farming system, with the bias in favour of livestock. Whereas, at present, arable lands in the area under discussion are utilized largely for the production of cash crops, as a more or less independent venture, it is necessary that these lands should be closely incorporated in the whole farming system, with cash crops (e.g., wheat and maize) replaced to a large extent by fodder crops and pastures, and reduced thus to their rightful place in suitable ley rotations.

The perennial crops to be sought are more especially those that will supply hay, silage material and winter pasturage to ensure continuity of fodder supply throughout the year, and especially during periods of drought. They must therefore be hardy, drought resistant, and able to establish themselves in competition with weeds. Four years of investigation in the district of Aliwal North (where there are

of ruminants) should be dropped until also just covered with the sublimate. Plants to be examined for prussic acid should be forwarded in the same manner.

The corrosive sublimate solution is obtainable from chemists. *N.B.*—It is extremely poisonous, should be labelled as such, and be kept locked away.

Water poisoning.—Two large wine bottles of the suspected water are required for a proper investigation.

Plant poisoning.—Suspected plants together with their bulbs, flowers and fruit should be packed between sheets of newspaper and cardboard and forwarded for identification.

The Covering Letter.

It is *absolutely essential* (1) that each specimen should be sent in a separate container, preferably a well-cleaned fruit jar; (2) that each specimen should be clearly numbered and marked with the name and address of the sender; and (3) that the nature of the contents and the name and address of the owner should be stated on the wrapper of the parcel. In addition, the covering letter should contain a full description of the history of the disease, the symptoms and post-mortem lesions, and all the possible information in connection with the feed, grazing, licks, etc., of the animals concerned. *This letter must be sent by post and not be included in the parcel.*

Bulletins on the above and other stock diseases are obtainable from the Director of Veterinary Services, Onderstepoort.

Warning.

It is most important that specimens of internal organs, water, etc., which are forwarded by rail or post, should be thoroughly packed in properly cleaned fruit jars or tins. Such containers must then be packed in boxes containing sufficient sawdust, grass or straw to prevent breakage. If containers are broken in transit they are simply thrown away by post or railway officials since they contaminate everything with which they come into contact. On the parcel should be written "Glass—With Care". Furthermore, specimens of internal organs should not be conveyed to Onderstepoort in bags by motor.

Turkish Tobacco:—

[Continued from page 26.]

When the whole crop has been harvested the tobacco is graded and baled according to pickings, leaf size and colour. The strings are cut from the reeds and packed in a pressing box with the butt-ends of the leaves facing outwards, and compressed. The bales weigh approximately 90 lb. and are done up in hessian in such a manner that the two butt-end sides and one of the end sides are visible.

All our Turkish tobacco is sent to the local tobacco co-operative society in this form, where it is graded and handled further according to the requirements of the market.

The bulletin is obtainable from the Stellenbosch-Elsenburg College of Agriculture at 3d. per copy.

Biological Control of Prickly Pear.

Dr. F. W. Pettey, Principal Entomologist, Uitenhage.

IN 1932 the Government decided, as a result of pressure from numerous farmers' associations to import *Cactoblastis cactorum* into South Africa for liberation in areas that were being overrun by prickly pear.

Research Laboratories Established.

After considering the facilities offered by the Councils of seven municipalities in prickly-pear areas, and the suitability of the localities, three Prickly Pear Research Stations were established, one at Graaff-Reinet in 1933, the second at Uitenhage early in 1935, and the third at Fort Beaufort in September 1936. All the work of the three stations is now directed from Uitenhage.

The activities of the three laboratories up to the present time have consisted mainly of the mass production and distribution of *Cactoblastis cactorum*, of the cochineal insect *Dactylopius opuntiae*, and of the boring beetle, *Lagochirus funestus*, and of investigations of the factors which hamper their progress in the veld.

The breeding, liberation and studies of the progress of the cochineal, *Dactylopius* species near *confusus*, an insect enemy of jointed cactus, have also been dealt with at Uitenhage and Fort Beaufort.

Since the establishment of the laboratories the staffs of the three stations combined have comprised four entomologists, four technical assistants, 12 European distributors and about 50 native and coloured labourers. The equipment has included about 900 large breeding cages and twelve motor vehicles. The cost to the public of maintaining these laboratories and in carrying on their activities has been approximately £9,000 annually.

Since the breeding stations have been established, the staff has produced, collected, and distributed 585,559,000 *Cactoblastis* eggs, and thousands of lorry loads of cochineal infested prickly-pear leaf pads throughout the pear-infested areas of the eastern section of the Cape Province. The number of *Lagochirus* beetles now liberated in coastal areas to which distribution of this insect is limited, totals about a third of a million, and this work is continuing at present.

What these Insects have Accomplished.

Cactoblastis.—Three to four years after this insect had been established in the veld, it had increased to vast numbers nearly everywhere, had greatly defoliated the large prickly pear plants, and had prevented them from fruiting for several successive years. Assisted by the cochineal it has prevented, and is continuing largely to prevent, the invasion of new territory by this weed by the destruction of the majority of young seedling plants as they appear. However, the intensity of population which *Cactoblastis* attained, resulted in the destruction of so much of the succulent parts of its food plants, on which it depended if it was to thrive, that there was a great reduction in the numbers of the insect due to malnutrition and disease organisms. The woody parts of the plant are not suitable as a food for this insect. Since its peak of increase *Cactoblastis* has nowhere succeeded in recovering to large numbers in the veld because of the numerous enemies it has acquired, chiefly in the form of insect parasites, predators and disease organisms. The mucilaginous sap of the host plant and high summer temperatures also hinder its progress considerably.

Cochineal Insect (Dactylopius opuntiae). When it was determined that *Cactoblastis* would not achieve the degree of eradication of prickly pear hoped for, the introduction of another insect of promise had to be considered.

At the suggestion of the writer and with the assistance of the Government of Australia, a consignment of the South African prickly pear was shipped from this country to Australia to determine if there was any species of cochineal there which would thrive on and damage it. Mr. A. P. Dodd's investigations there resulted in the importation of *Dactylopius opuntiae* in the year 1937. The insect was first tested and reared in the Uitenhage Laboratory. From the Uitenhage stock all the cochineal originated which was distributed throughout the pear areas. In a year after the insect was established in the veld, it had increased enormously, and in 18 months' time it had greatly defoliated the prickly pear plants. In the inland areas, i.e., forty miles or more from the coast, its intensity of attack is greatest, and here many large plants, especially in vleis soil where prickly pear was sheltered by bush, were so completely defoliated that they were killed. This degree of damage persisted for about three years in the coastal areas and it continues to persist in most of the inland areas, except on cold, exposed mountain slopes or localities exposed to limited sunshine in winter. In the more coastal areas the cochineal now fails to increase rapidly enough to compete with its acquired enemies.

This cochineal insect, a year or two after it became established in the veld, acquired two natural enemies, viz. the ladybird beetles, *Cryptolaemus montrouzieri* and *Eucychomus flavipes*, and more recently in non-Karoo areas a fungus known as *Empusa* sp. has been found to attack it. These enemies result in seasonal depletion of the cochineal every late winter and spring, following which, the cochineal, up to the present at any rate, increases and so outnumbers the beetles in the more inland areas that it still continues to defoliate the prickly pear periodically, though not to the same degree as occurred before the predator beetles appeared.

These enemies of cochineal now prevent it from attaining such intensity of population on growing prickly pear plants as completely to destroy them.

Felling of Prickly Pear and Further Destruction.

Investigations by the writer in 1938, based on similar ones in Australia with a different species of *Opuntia* by A. P. Dodd, revealed that cochineal would completely kill prickly pear plants, large and small, soon after they were felled. Plots to demonstrate this to farmers and municipalities were established in all divisions of the prickly pear areas in 1939 and 1940. At the same time a circular was issued, urging property owners concerned to fell all prickly pear as soon as it was well infested and considerably defoliated by the cochineal, with full instructions how to do the work properly. Those property owners who followed the Department's advice and instructions correctly, have been well rewarded by practically clearing their veld of this weed. Those who felled their pear, leaving high stumps, or who did not cut their prickly pear when cochineal was in good condition, have attained only partial success, with few exceptions.

About two years ago a large-scale felling experiment was started by the Department of Agriculture under the supervision of Government officials. Up to the present about 12,000 morgen in the vicinity of Cookhouse and over 30,000 in the vicinity of Graaff-Reinet of what was a dense jungle of prickly pear until the cochineal, assisted by *Cactoblastis*, had defoliated it, have received treatment by felling

the plants. The whole of these areas is to a very great extent cleared of the weed, but without the assistance of the cochineal it would have been impractical and impossible to have accomplished this work.

The results have been so good that the Government has now taken steps to encourage felling more extensively by offering to assist property owners in this work on the pound for pound principle. Those who desire financial assistance should apply to the Chief Weeds Inspector, P.O. Box 145, Grahamstown, who will furnish all particulars.

In the coastal areas, however, the cochineal fails now to compete with its beetle enemies in the rate of increase, even in the summer months. In many coastal and non-Karoo areas the cochineal has also acquired a fungus enemy, *Empusa*, which retards its progress seriously. Consequently, the Government is considering the importation of more promising insect enemies of our prickly pear pest from Mexico and elsewhere, which, it is hoped, will be more effective than those we now have in the control of this weed in areas where cochineal is unsatisfactory.

The Boring Beetle (*Lagochirus Funestus*).

This beetle was imported from Australia about three years ago. Only in the larval stage is it destructive to prickly pear. The grubs burrow in the woody segments of the plants, causing the branches to collapse. It kills only the woody parts of the plant and not the leaf pads. To date a total of 325,750 adult beetles has been produced at the three stations combined, from 1942 to 1945 inclusive, since rearing of this insect was started, with an average fold increase of 17.1. A total of 287,628 beetles has been distributed in the veld in the divisions of Uitenhage, Port Elizabeth, Fort Beaufort, Albany, Stockenström, Bedford and Bathurst. Up to the present, although three generations have been in the veld, the results have been disappointing everywhere. It has diminished in numbers and has not increased anywhere in spite of restocking. Its progress is hindered particularly by excessive mucilaginous secretions of the pear in the furrows of the bark made by the beetles for deposition of their eggs. The mucilage hardens, often killing the eggs before they hatch and destroying the young larvae. Other factors hampering the progress of this beetle in the veld are:—

(1) *Climatic*.—The beetles fail to lay in the absence of rainfall. Egg laying is poorer in winter than in summer.

(2) *Predators*.—Ants, lizards and spiders kill the adult beetles. Rodents destroy the grubs by burrowing into their cocoons. It is extremely doubtful, therefore, if this insect will ever be able to subside in prickly pear under our South African conditions.

The Dry-Lands Problem in the north-eastern Cape Province:—

[Continued from page 28.]

a pasture grass and, like *Setaria* du Toitskraal, provided four grazings during last season under dry-land cultivation.

The above investigations have been conducted on the farm Elandschoek, owned by Mr. L. S. Dorington, in the district of Aliwal North, and are scheduled to continue for another four years. Unfortunately seed of the grasses recommended is not yet available to farmers, but every endeavour is being made to extend their cultivation, and it is hoped that seed will shortly be available in large quantities.

Fertilizing of Maize :

The Effect of Phosphate, Nitrogen, Potash and Compost.

L. L. Eksteen, Lecturer in Chemistry, College of Agriculture,
Glen, O.F.S.

IN the worth-western Orange Free State experiments are being carried out with maize in order to determine the effect of various quantities of fertilizer on the grain yield of maize.

In the first experiment the effect of phosphatic fertilizers only was examined, and these results appeared in the June 1945 issue of *Farming in South Africa*. In the second experiment, which is discussed here, the effect of ammonium sulphate, chloride of potash, kraal manure and compost, together with or without superphosphate, was examined. The experiment plot adjoins experiment plot No. 1, and consequently soil conditions and the locality are as nearly identical as possible.* Table I reflects the composition of the soil.

TABLE I.—*Composition of the Soil.*

Soil Properties.	At a Depth of	
	0" to 12".	12" to 24".
pH.....	6.8	7.0
% Citric acid soluble P_2O_5	0.0005	0.0005
% Total P_2O_5	0.0206	0.0329
% CaO.....	0.185	0.213
% K_2O	0.652	0.084
% Sesquioxide.....	4.61	8.16
% Total N.....	0.0300	
Hygroscopic moisture.....	0.96	2.2
Sand coarser than 2 mm.....	0.0	0.0
Sand 2 to 0.2 mm.....	13.35	13.8
Sand 0.2 to 0.02 mm.....	74.05	64.3
Mud 0.02 to 0.002 mm.....	3.5	4.4
Clay finer than 0.002 mm.....	8.5	17.9

Applications of Fertilizer.

The following symbols explain the treatments included in the experiment. All applications are on the basis of one morgen, and annually, unless otherwise specified.

P_3 stands for 300 lb. superphosphate.

M_5 stands for 5 tons of kraal manure applied only during 1936. In 1942-43 the application was repeated, but with municipal compost (C_5).

m stands for 800 lb. kraal manure.

N stands for 100 ammonium sulphate.

NT stands for 100 lb. ammonium sulphate applied just before the panicles of the maize opened.

K stands for 60 lb. chloride of potash.

After the 1938-39 season, some of the treatments were altered so that:

$P_{1\frac{1}{2}}$ stands for 150 lb. superphosphate.

P_2 stands for 200 lb. superphosphate.

$C_{\frac{1}{2}}$ stands for half a ton of municipal compost.

* The technique also was the same as that described in the first experiment.

FERTILIZING OF MAIZE.

C₁ stands for one ton of municipal compost.

C₂ stands for two tons of municipal compost.

Granular K stands for 333 lb. granular fertilizer 2·5—12—5 which, in composition, is equivalent to the P₂NK treatment.

N.B.—The superphosphate was of 20 per cent. strength throughout.

Composition of Kraal Manure and Municipal Compost.

The kraal manure and the compost had the following composition on a wet basis.—

	% Moisture.	% N.	% P ₂ O ₅ .	% Org. Matter.
Kraal manure.....	50·7	0·85	0·7	16
Compost.....	20·1	0·9	0·65	26

Results of Second Experiment.

The yield in bags per morgen is given in Table II.

TABLE II.—Yield in Bags of 200 lb.

Date of planting.	2/12/36.	20/11/36.	Date of planting.	22/11/39.	29./11/40.	10/1/42.	13/11/42.
Type.	Anveld.	Eksteen.	Type.	Eksteen.	Silver King.	Boes- man.	Eksteen.
Treatment.	1930/37.	1938/39.	Treatment.	1939/40.	1940/41.	1941/42.	1942/43.
O.....	10·8	8·4	O.....	9·1	14·7	7·0	16·5
P ₃	14·2	18·4	P ₃	15·0	20·1	12·1	20·9
M ₃	15·2	11·1	M ₃	11·4	14·2	8·4	22·2
P ₃ M ₃	16·5	18·0	P ₃ M ₃	12·8	19·2	11·8	20·7
P ₃ M.....	15·4	19·0	P ₃ C ₁	15·4	19·8	13·4	21·2
m.....	10·3	9·2	P ₃ C ₁	18·0	21·9	14·0	22·6
P ₃ Nt.....	13·2	17·5	P ₃ C ₂	15·3	21·2	15·1	21·5
P ₃ N.....	14·7	18·4	P ₃ N.....	14·5	19·9	12·1	21·1
P ₃ ½M.....	14·5	17·2	P ₃ ½M.....	15·2	19·7	11·5	21·2
P ₃ K.....	12·7	19·4	Granular K...	15·1	20·2	12·7	20·6
P ₃ NK.....	16·4	19·9	P ₃ NK.....	14·7	20·3	12·4	21·1
Reliable difference (P = ·05)	2·6	2·1	Reliable difference (P = ·05).	2·4	1·4	1·5	1·9

Discussion and Conclusions.

As a result of late rains, during the 1937-38 season, the experiment plot was planted only on 15 January 1938 without any application of fertilizer. Owing to the shortness of the season, the plots were not harvested for purposes of the experiment. During the 1941-42 season, the rains also came late and the yields of this short season were generally low and considerably damaged by frost.

The yield figure indicates, in the first instance, a considerable crop increase in all cases where phosphate was applied, but there was no further increase where nitrogen or potash was applied. The application of artificial fertilizers on these sandy soils is, therefore, a waste of capital. The granular fertilizer, which is also a mixture, gives no better results than pure superphosphate. The only

advantage of this fertilizer is that it is more pleasant to handle than the powdery fertilizers, but that does not justify the extra expense.

The annual application of 800 lb. kraal manure per morgen makes no significant difference to the yield. The application of 5 tons of kraal manure per morgen during 1936, however, showed results equal to those obtained from an application of 300 lb. super per morgen during the first year, but after the third season the residual effect had disappeared. This heavy application of kraal manure, plus 150 or 300 lb. super produces no better yields than super alone. A repetition of the application of 5 tons of compost per morgen in 1942-43 brought the yield from treatment M_2 level with that of all



The plot on the left received no artificial fertilizer, while that on the right received 200 lb. super phosphate per morgen.

[Photo: L. L. Eksteen.]

phosphate treatments; in other words the need for phosphate was again supplemented. The annual application of half a ton, one ton and two tons of compost, together with super, also showed no improvement of the crop. From these results it may, therefore, be deduced that as soon as sufficient compost is applied to maize to fulfil its requirements in regard to phosphates, the same yield can be obtained as with an application of superphosphate. During dry seasons, however, the large quantities of nitrogen in compost may have a detrimental effect on the crop as a result of a too luxuriant growth of foliage.

Effect of Fertilizing on the Quality of Grain.

Under normal conditions, fertilizing does not affect the grade of the maize, but it had a marked effect on the 1941-42 crop. Early frost seriously damaged the grain; in treatments 0 and M_2 the damage was so great that grain with 9 per cent. defective kernels could be classified only as sample grade. The grain of all the other treatments was of grade 6, that is first grade usable grain. These results are also a clear indication of the retarding effect which lack of phosphates has on the ripening of grain.

Since the soil in these parts is particularly deficient in available phosphoric oxide, phosphate fertilizer as well as applications of kraal

FERTILIZING OF MAIZE.

manure not only increase the crop, but also the phosphoric oxide content of the grain, as indicated in Table III.

TABLE III.—*Percentage Phosphoric Oxide in Grain.*
(Composite samples.)

Treatment.	Percentage phosphoric oxide in grain. (Composite Samples).			
	1936/37.	1938/39.	1940/41.	1942/43.
Q.....	0·662	0·605	0·793	1·017
P ₂	0·720	0·883	1·027	1·282
P ₂ M ₆	0·809	0·941	1·012	1·343
M ₆	0·757	0·708	0·817	1·339

The after-effect of the application of 5 tons of kraal manure is reflected in Table III. As the yield decreases, that is, as the phosphate deficiency in the soil becomes apparent, the phosphoric oxide content of the grain also decreases in comparison with the other treatments.

Effect of Fertilizing on the Citric-Acid Soluble Phosphoric Oxide in the Soil.

Composite samples of the first 12 inches of soil were taken in 1939, and in 1943 separate samples were taken of the plots. A few of the interesting figures are given in Table IV.

TABLE IV.—*Citric-acid soluble phosphoric oxide in the top soil.*
P.P.M.*

Treatment.	1939.	1943.
Q.....	5·0	5·5
P ₂	5·4	7·3
M ₆	7·5	12·5
P ₂ M ₆	9·1	22·1
Reliable difference (P = 0·05).....	—	3·0

* Parts per million.

From Table IV it is clear that if adequate quantities of kraal manure are applied, the phosphate content of the soil may be considerably increased—even to the point of obtaining maximum yields. The after-effect of kraal manure is attributed mainly to this increase in phosphates. From these results it may also be deduced that an application of 75 to 100 lb. super plus 2 to 3 tons of kraal manure per morgen, ought to yield good results. Since kraal manure is bulky, and takes much time to transport, the application of this manure should be undertaken only on lands which are situated near kraals and at a time of the year when labour can be spared.

Summary.

The soil is very sandy and subject to wind-erosion; it is deficient in phosphates.

Annual applications of 200 lb. superphosphate per morgen bring about a large crop increase, whilst potash and nitrogen have no additional effect on the grain yield.

The annual application of 800 lb. kraal manure per morgen has no effect on the crop yield.

Fowl Typhoid.

J. D. W. A. Coles, Research Officer, Onderstepoort.

OWING to the extraordinary rapidity with which fowl typhoid is spreading over the Union, particularly on the highveld of the Transvaal, and the enormous losses occasioned by this disease, it is felt that the time is ripe to review the whole problem.

Fowl typhoid is a specific acute bacterial disease of fowls and turkeys, and unfortunately is now also killing off chickens and poults in ever-increasing numbers. The disease is due to a small bacterium called *Salmonella gallinarum*, and the organisms are present in large numbers in the droppings which contaminate the soil, food and water. Some apparently healthy fowls are "carriers". This means that their droppings contain the dangerous infection, although the fowls are not visibly ill.

Symptoms.

There is generally a sudden onset of the disease, and a large number of fowls may die within a week. The usual thing, however, is for 2 or 3 fowls to die each day.

The symptoms are:—Loss of appetite, increased thirst, dullness, ruffled feathers, head held close to the body, drooping wings, closed eyes and sleepiness. Diarrhoea is almost a constant symptom, the droppings being greenish-yellow. The comb is usually dark red to purplish-blue in colour, but in some cases it may be pale. There is high fever and the fowl is hot to the touch. There is also loss of condition and, finally, marked prostration, profuse diarrhoea and unconsciousness. Death may occur at any time within 4 days after the onset of the symptoms.

Post mortem Appearances.

At *post mortem* the liver is found to be enlarged and friable, and often has a bronze or greenish-bronze colour. Sometimes it may have a slightly mottled appearance, particularly in chronic cases of the disease.

The spleen is usually much enlarged. There is intestinal catarrh and even blood mixed with the intestinal contents.

Diseases Resembling Fowl Typhoid.

1. *Visceral gout*.—The spleen is never enlarged and the liver never has a bronze colour. Apart from these differences, however, the two diseases are easily confused.

2. *Spirochaetosis* and *Aegyptianellosis*.—Only a microscopic examination of the blood can reveal the causal parasites, which are transmitted by the tampan. The spleen is enlarged, but the liver never shows a bronze colour.

3. *Arsenical poisoning*.—There is generally thick tenacious mucus in the intestines and reddening of the membrane. A number of cases usually occur very suddenly. Chemical examination of the liver will reveal the arsenic.

4. *Bacillary White Diarrhoea in adult fowls*.—This is very rare, and only an expert can tell the difference.

In turkeys and fowls, whether young or old, the symptoms and lesions of fowl typhoid are always the same.

Prevention.

As all the ground rapidly becomes infected when once the disease has broken out, all survivors should, if possible, be put in houses and pens with concrete or other impervious floors. The safest measure is

to kill off and burn all fowls and turkeys the moment they become ill. This will reduce the infection still further.

Install dropping boards under the perches, and collect and burn or bury all droppings daily. Feed green food, mash, grain and water in receptacles into which the fowls cannot defecate. Before being fed, no food or water should come in contact with fowl droppings in any way.

The litter should be swept out and burned every second day till the disease stops, and the whole house should be sprayed well with a 2 per cent. carbolic acid solution before the new litter is put in. Also change the nest-hay every second day.

Telegraph or write for fowl-typhoid vaccine immediately, and inoculate all fowls and turkeys at the earliest possible opportunity. The fowls and turkeys must not be allowed out for another fortnight, which represents the time taken for immunity to develop.

No dipping of the fowls or medicinal treatment is of any use, and it will pay to kill off and burn all sick poultry.

The successful eradication of typhoid diseases depends on a combination of:—

1. Hygiene, i.e., clean houses, uncontaminated food and water, and proper disposal of the faeces; and

2. Vaccination.—Farmers attend to vaccination, but almost invariably neglect the necessary hygienic measures, and it is for this reason that the vaccine is sometimes considered useless. Without good hygiene nothing can stop the disease from gaining even a greater hold on the country.

Farmers should be particularly careful not to buy fowls anywhere and everywhere, as they may be in the incubation period of up to 14 days, and so look quite healthy. A week or so later all the damage will be done. Since the B.W.D. test shows up carriers of both B.W.D. and fowl typhoid, farmers should buy all new stock from holders of the B.W.D. Test Certificate.

Since the droppings contain millions of fowl typhoid germs, it is very easy for fowl food sacks to become contaminated on a farm. For this reason fowl food should always be sold in new bags, or in bags that have been put in boiling water for five minutes. Naturally, the bags are dried before use.

Where the disease is established and vaccination seems to have no effect, the only thing for the farmer to do is to keep his fowls strictly on the intensive system, i.e., on an impervious floor, and to attend to the purity of the food and water, and vaccinate as well. The intensive system is also the main weapon of defence against other soil-borne diseases such as cholera, coccidiosis and worms, as well as diseases due to tampons and other external parasites.

Vaccination.

The vaccine, if unopened and stored in a cool, dark place, may be kept as long as 2 months. A hypodermic syringe, graduated in cubic centimetres, and 6 hypodermic needles are necessary for the operation. The Division, however, only stocks a 5 c.c. syringe; price, 11s. complete. See also special leaflet on "Supply of Syringes to Stock-owners".

Loosen the syringe, and boil it and the 6 needles for ten minutes before commencing to inoculate. Then tighten up the syringe, fill it with vaccine and begin. A pot of boiling water should be close at hand, so that a fresh needle may be used for each bird.

Inoculate under the skin of the breast. The dose for fowls and turkeys, irrespective of age, is 1 c.c. A second inoculation, identical with the first, must be carried out a week later.

Except when advised to do so by the Division of Veterinary Services, farmers should not inoculate poultry under 2 months of age.

When typhoid does break out in young chickens, they should be kept on $\frac{1}{2}$ -inch mesh wire netting. When they are two months old they can be inoculated, and a fortnight later they may be liberated in a new clean camp.

Farmers should, however, not wait for the disease to break out before inoculating their poultry.

Immunity generally takes 12 to 14 days to develop, and may be expected to last about 9 months. The vaccine is harmless, and may be used whenever desired. If the operation is carefully performed, laying should not be affected. Vaccination does not render poultry unfit for human consumption.

Though vaccination can prevent the further spread of the disease, it cannot cure sick birds or clean up the infection in carriers. Hence, vaccination can never completely eradicate fowl typhoid on a farm. The only way to eradicate fowl typhoid completely is to have all the fowls and turkeys submitted to the B.W.D. test. As mentioned already, the one test eliminates carriers of both fowl typhoid and bacillary white diarrhoea. A separate pamphlet dealing with the whole question of B.W.D. is obtainable from the Director of Veterinary Services, Onderstepoort, or the Officer-in-Charge, Allerton Laboratory, P.O. Box 405, Pietermaritzburg. Generally speaking, it is not recommended that small farm flocks should be tested for B.W.D. The test is most useful for the owners of large flocks and the sellers of day-old chicks and breeding stock.

Vaccination is done entirely at the owner's risk, and the Department of Agriculture accepts no liability for any mortality that may occur as a result thereof.

The vaccine is put up in bottles containing sufficient material to inoculate 10, 25, 50 or 100 birds *once* and may be obtained on application to any District Government Veterinary Officer or Resident Magistrate, or direct from the Director of Veterinary Services, P.O. Onderstepoort (telegraphic address: Microbe, Onderstepoort); or the Officer-in-Charge, Veterinary Research Laboratory, Box 405, Pietermaritzburg (telegraphic address: Bacteria, Pietermaritzburg), at the rate of 5s. per 100 double doses, i.e., sufficient vaccine for the double inoculation of 100 birds. The vaccine for both inoculations is sent in one consignment.

Laboratory products are only issued on prepayment or c.o.d. per post or rail, but it will be to the advantage of applicants to remit cash with order, as otherwise, in addition to the cost of the articles, they must also pay the c.o.d. charges, which if the parcel is sent per post, may run into quite an appreciable amount, as the minimum is 1s. per parcel. Cheques, etc., must be made payable to the Director of Veterinary Services.

When replying to a letter or telegram always refer thereto by quoting the number and date thereof.

IMPORTANT NOTICE.

Will persons who place orders for vaccines please note that:—

- (a) No refund of the purchase price or credit will be made if purchasers return the vaccine to the Department.
- (b) Such returned vaccine will always be destroyed.

Ask for Price List of Laboratory Products and note the correct addresses.

Veld Management in South-Eastern Border Districts of the C.P.

J. H. Preller, Döhne Pasture Research Station, Division of Soil and Veld Conservation.

THE area which is served by the Döhne Pasture Research Station is bounded by the coast on the eastern side, by the railway line between East London and Somerset East on the southern side and on the western and northern sides by a line which runs more or less through Somerset East, Mortimer, Tarkastad, Sterkstroom and between Molteno and Jamestown to Lady Grey, Maclear and Qumbu, whence it runs along the Umzimvubu river to Port St. Johns.

Three Veld Types.

According to the types of veld, this area may be divided into into three parts, viz., (i) the coastal area; (ii) the tall grass area; and (iii) the short grass sweetveld area.

(i) *Coastal area*.—This area is about thirty miles wide, with an annual rainfall of over thirty inches and a very temperate climate. The winters are not so cold that the grass stops growing. The veld is sweet and the soil consists of a good type of loam.

On the whole the veld has a very dense cover and consists chiefly of rooigras (*Themeda triandra*) and a certain amount of tamboekie grass (*Hyparrhenia buchananii*).

(ii) *Tall grass area*.—This type of veld covers by far the largest area. It lies between the East London-Somerset East railway line and Mortimer-Tarkastad-Sterkstroom-Xalanga-Elliot-Ugie-Maclear-Qumbu, the Umzimvubu and the coastal area.

On the whole the rainfall is 30 inches and under, except in the vicinity of Maclear, Ugie and Elliot, where it is between 30 and 40 inches.

With a few exceptions the soil is acid and of a sandy loam to a sandy type, which is of no great value for crop production and is very erodible when brought under cultivation.

On the higher slopes, tamboekie grass (*Hyparrhenia*) and stinkgras (*Cymbopogon*) are the most common types, whilst stinkgras sometimes predominates under high rainfall conditions. On the more low-lying parts the veld consists mainly of rooigras (*Themeda triandra*); types of steeksaadgras (*Andropogon spp.*); rooisaadgras (*Tristachya*) and lemon grass or koperdraadgras (*Elyonurus*). To a large extent it is, therefore, sour veld.

(iii) *Short grass sweetveld area*.—This type of veld is bounded by a line running from Sterkstroom, between Jamestown and Molteno, to Lady Grey-Maclear-Ugie-Elliot-Xalanga and back to Sterkstroom.

In the major part of the area the annual rainfall is below 30 inches, except in the vicinity of Maclear, Ugie and Elliot, where it is over 30 inches. The winters are very severe and snow is a fairly common occurrence in the mountainous parts. The soil is sweeter and more suitable for crop production than in the tall grass area.

On the whole the veld is sweet, with a type of dwarf rooigras predominating, whilst koperdraadgras, finger grasses, hawersaadgras and grasses of the taaipol family (*Eragrostis*) are fairly common.

The Most Suitable Type of Farming According to Veld Type.

In order to manage grazing correctly, so that it does not deteriorate in composition, density and carrying capacity, it is absolutely

essential in the first place to suit the type of farming to the veld and not to force the veld to adapt itself to the type of farming. If the latter course is adopted, the ultimate outcome can be nothing but disastrous for veld, soil, animal and the farmer himself.

By this is meant that veld which is inherently suited to sheep farming should be used mainly for that purpose, whilst veld which is essentially suitable for cattle farming should be used mainly for that purpose.

According to the type of veld, therefore, cattle farming should be practised mainly in the coastal and tall grass areas and sheep farming in the short grass area, whilst farming in the tall grass area, which, as has been mentioned, is sour veld and therefore of no value as pasturage in winter, should be aimed at providing hay, silage crops and green grazing as winter feed for the stock. In the coastal and short grass areas, cash crops may receive more attention as it is possible to conserve the veld here in summer to serve as a reserve of feed for winter. This does not imply that hay or silage should not be made here, however.

Malpractices and their Consequences.

In general we are too inclined to force nature to dance to our tune and consequently, in the tall grass and sour veld area, we find that sheep farming is practised mainly instead of cattle farming.

The result of this practice, which is contrary to Nature, is that methods have to be employed to keep the grass short enough to be suitable for grazing by sheep. It is a well-known fact that sheep can make no progress on tall grass veld. The following methods are therefore adopted:—

(a) The veld is burnt practically every winter, irrespective as to whether there is a large surplus of old grass or not, as hard and old sour grass hampers sheep in grazing.

(b) Parts of the veld are burnt in spring so that the sheep will have short, young grass to graze in summer when the spring grazing becomes too hard for them or when it has been cropped so closely that they can no longer subsist on it.

(c) Parts of the veld are burnt in February and March to supply the sheep with green grazing in autumn when the summer veld deteriorates.

(d) The veld is always grazed heavily to keep it short enough for sheep.

Even where cattle are kept in the tall grass area, veld-burning in season and out of season, is practised only too often—no old grass may remain on the veld! Spring and autumn burning has resulted in the rapid increase of *Senecio*, a plant which is extremely toxic to all animals.

Unnecessary burning of veld results in the systematic destruction of the organic matter which covers the soil and helps it to absorb rain-water, with increased run-off and sheet and donga erosion in consequence.

Another result of these malpractices is that the grass, and in this case especially the sweet and best grass, is not given a proper opportunity to seed. These grasses decrease by degrees and are replaced by harder, more unpalatable grasses with less nutritive value. This reduces the carrying capacity of the veld still more, and as the farmer's financial obligations do not permit him to reduce the number of his stock to any extent, his veld becomes more and more overstocked and trampled.

VELD MANAGEMENT IN SOUTH-EASTERN BORDER DISTRICTS OF THE C.P.

Where the veld is overstocked and trampled, soil erosion spreads, whilst *Senecio* and other toxic plants increase rapidly and thorn-tree and bush encroachment assumes alarming proportions by leaps and bounds.

To prove how much veld-burning can reduce the carrying capacity or yield of the veld, the following data of a veld-burning experiment which was carried out at this station are quoted:—

Weight of Hay in Pounds obtained from 2 Plots of 60 by 120 feet each:—

	1940-41.	1941-42.	1942-43.	Total.
Cleared by mowing in winter.....	320	258	454	1,032
Burnt with head wind in winter.....	101	37	138	276
Burnt with rear wind in winter.....	99	35	142	276

Apart from the disadvantages of veld-burning which have already been mentioned, its detrimental effect is manifest from these figures, as almost four times as much hay was obtained from the unburnt veld as from the burned veld over a period of three years.

How to Prevent Detrimental Effects.

The first and most important essential for counteracting and eliminating the detrimental effects of mismanagement is more camps. In each camp proper provision must be made for watering-places. Further, the camps must be made so as to divide the sweet from the sour veld and the high-lying from the low-lying veld. This will prevent the sweet veld from being overstocked and trampled while the sour veld becomes hard and worthless. It will also prevent stock from forming footpaths, which eventually develop into sloats, when proceeding from the high-lying to the low-lying veld and vice versa.

With more camps the sourveld can be managed more effectively by following a system of rotational grazing by which the sour grasses can be utilized to the best advantage. If there is a surplus of grass, the camps on level veld may be closed temporarily for the mowing of hay, and included in the system in autumn again, when it will provide excellent after-growth grazing. The hay serves as a valuable supplement to the supply of winter feed. It is possible, then, to close some of the camps in the sweetveld in seasons of plenty in order that they may be used as grazing camps in autumn and winter.

More cattle and fewer sheep will have to be kept, especially in the tall grass and sweetveld areas. This is the only practical system which may be applied on this type of veld without causing permanent damage to the veld.

By making more extensive use of the mower, especially on the tall grass and sourveld, the necessity for burning grass, with all its attendant evils, will be reduced to a minimum. In summer, surplus grass can be mown for hay, and in winter for bedding and compost.

If it does become necessary to burn the veld, the best time is after the first spring rains before the grass has started to sprout. If burning takes place while the grass underneath is still damp, the upper part only is removed, whilst the layer of dead vegetable material remains undamaged as a protection against erosion or the scorching rays of the sun. When sloping veld is burnt, it is a good idea to burn more or less on the contour, so that the lower portion of the slope is burnt one season and the upper portion the

next. In this way a strip of unburnt veld is always left to stem the water which rushes down, and thus to prevent erosion.

It is most desirable to remove all stock as far as possible from the veld during winter, especially on the tall grass sourveld. As the veld is of practically no value then, stock wander about unnecessarily in the vain hope of finding something to eat. This causes deterioration in the condition of the animals and unnecessary trampling of the veld, which finally leads to erosion. In this case provision must naturally be made for feed during this period.

Provision of Feed.

Winter feed can be supplied in the form of (a) hay, (b) silage and (c) established winter pastures.

(a) *Hay*.—The ideal is to obtain hay from established perennial grass pastures which will supply a good yield of high quality as well as good after-growth grazing for autumn. These perennial grasses assist in protecting the soil against erosion and in building up fertility. Annual grasses and crops may, of course, also be used.

The best perennial grasses are Rhodes grass, *Paspalum dilatatum*, *Paspalum urvillei* (formerly known as *Paspalum virgatum*) and *Acroceras macrum*. The best annual crops are teff and Japanese millet, sown singly or together, soybeans and cowpeas.

(b) *Silage*.—Babala, maize and kaffircorn are the most suitable for silage, whilst good silage may also be made of the established grasses if molasses are added.

(c) *Winter grazing*.—As the area has a predominantly summer rainfall, generally speaking, winter pastures can only be relied upon during the first half of winter. Where irrigation water is available, it is a different matter, of course.

The most suitable crops for this purpose are Italian rye grass and *Phalaris tuberosa*, which may be sown alone or in mixtures with subterranean clover and white clover, as well as New Zealand Tall Fescue, oats, wheat, barley and rye.

Just a final word: The best system of veld management is that which enables the veld to maintain and even to improve its present carrying capacity. The veld is the cheapest source of food for animals. If we treat it well, it will repay us well and maintain this reputation.

Reprints of Government Notices, 1945.

No. 367.—Regulations in Connection with the Control of the Sale of Seeds Mixed with Weed Seeds—Dodder, Nut-grass and Sheep Sorrel.

No. 368.—Requirements in Regard to Declared Seed.

No. 666.—Conditions Under which Seeds are Analyzed, Tested and Examined by the Seed-Testing Station.

(Obtainable from the Principal, College of Agriculture, Potchefstroom.)

The Value of Lucerne as Grazing for Pigs.

G. W. Johnston, Stellenbosch-Elsenburg College of Agriculture, Stellenbosch.

IN the United States of America, the largest and most important producer of pork products in the world and a country where the consumption of pork in its different forms is approximately 50 per cent. of the total meat consumption, lucerne has always been regarded as the most valuable grazing crop for pigs.

In the following experiments carried out by the Stellenbosch-Elsenburg College of Agriculture, an attempt was made to find out to what extent lucerne grown under dry-land conditions in the western Cape Province could be of assistance in lowering the cost of producing bacon pigs.

1st Experiment.

For this experiment a litter of pure-bred Large Blacks and a litter of pure-bred Large Whites were available. The Large Blacks were born on 8 May 1944 and the Large Whites on 7 May 1944.

From the age of 14 days both litters were run in camps where the lucerne was beginning to grow after a very dry summer. This young lucerne undoubtedly assisted to a large extent in the very satisfactory rate of gain made by the young pigs.

At weaning age at 8 weeks the Large White litter consisting of 9 pigs weighed 370 lb. The heaviest was 50 lb. and the lightest 31 lb. The average weight was 41.1 lb. The actual increase was 343 lb. which was obtained by deducting the initial birth weight of 27 lb. The meal fed was 822 lb. This includes the feed fed to the sow. The amount of feed fed per lb. gain was 2.4 lb., and the average daily gain per pig was .67 lb.

The sow was not weighed but certainly lost some weight. At weaning time, however, she was still in suitable condition to be served again.

The Large Black sow received approximately the same treatment.

Her litter of pigs was weaned at 8 weeks. The total weight of the pigs was 394 lb. The heaviest was 51 lb. and the lightest 39 lb., the average weight being 43.7 lb. By deducting the initial birth weight of 30 lb. an increase of 364 lb. was obtained. The meal fed was 820 lb. This includes the meal fed to the sow and was 2.25 lb. per lb. live weight gain in the litter. As in the case of the Large White, the sow was not weighed but certainly lost some weight. At weaning time, however, she was still in suitable condition to be served again.

The pigs were weaned and divided into 3 groups. Each group consisted of 3 Large Whites and 3 Large Blacks. The 3 groups ran in lucerne camps.

The 1st group received a full ration of meal.

The 2nd group received $\frac{2}{3}$ of the meal fed to the 1st group.

The 3rd group received $\frac{1}{3}$ of the meal fed to the 1st group.

Although the 1st group was supposed to receive a full meal ration, they were running on the lucerne. Had they been in a camp devoid of grazing, they would probably have been able to take more meal. It would probably be more accurate to regard the 1st group as being fed $\frac{2}{3}$ of a full meal ration, the 2nd group $\frac{1}{3}$, and the 3rd group $\frac{1}{3}$.

The camp in which the 1st group was placed did not have as much lucerne as did the camps in which the 2nd and 3rd groups

were placed. There was very little difference between these two camps but, owing to the increased amount of lucerne consumed by the third group towards the end of the grazing part of the experiment, the 3rd group was changed to the 2nd group's camp and the 2nd group placed in the 3rd group's camp.

The general health of the Large Blacks in all three groups was good. The Large Whites suffered from sunscald and never appeared as thrifty as the Large Blacks.

When the 1st group averaged 165 lb., all the groups were brought into the sties for finishing.

The experiment began on 10 July, and the pigs were brought into the sties on 16 October, the intervening period being 14 weeks.

	Group 1.	Group 2.	Group 3.
Days in experiment.....	98	98	98
Live weight in lb. on 10 July 1944...	274	278	281
Live weight in lb. on 16 October 1944....	990	868	725
Increase in lb.....	716	590	444
Meal consumed, in lb.....	2,079	1,386	603
Meal in lb. per lb. live-weight increase..	2.903	2.349	1.360
Daily gain per pig in lb.....	1.218	1.003	.755

In each group the Large Blacks made greater gains than did the Large Whites.

	Group 1.	Group 2.	Group 3.
Live weight of Large Blacks, 10 July 1944	138	139	142
Live weight of Large Whites, 10 July 1944	136	139	139
Live weight of Large Blacks, 16 October 1944.....	530	460	394
Live weight of Large Whites, 16 October	454	408	331
Increase of Large Blacks in lb.	398	321	252
Increase of Large Whites in lb.....	318	269	192
Increase of Large Black over Large Whites in lb.....	80	52	60

Many English farmers consider that although the Large White is an excellent bacon pig, it is more suitable for good feeding in a sty than for grazing or feeding on swill. This experiment would appear to indicate that in this case at any rate the Large Blacks made better use of the grazing than did the Large Whites. To what extent this was due to sunscald, is impossible to say.

On the full feed, group 1 suffered less from sunscald than did the other groups. The Large White pigs in group 3 were the worst. This is believed to be due to the fact that owing to the small grain ration they ate more lucerne.

The pigs were all brought into the sties and fed until they reached bacon weights. They were marketed in two lots on 14 October and on 4 November.

On 14 October 3 Large Blacks and 2 Large Whites in group 1 and 2 Large Blacks and 1 Large White in group 2 were marketed. On 4 November the remaining pigs, with the exception of one Large White which was still too light, were sold and the experiment completed.

When brought into the piggery the Large Whites were placed in sties separate from the Large Blacks so as to give them a better chance.

THE VALUE OF LUCERNE AS GRAZING FOR PIGS.

The results of the fattening were as follows.

	Group 1.	Group 2.	Group 3.
Weight on 16 October 1944 in lb.....	990	868	725
Weight at marketing in lb.....	1,216	1,188	1,132
Increase in lb.....	226	320	407
Pig-days.....	195	237	300
Increase per pig per day in lb.....	1.159	1.308	1.357
Feed in lb.....	1,152	1,390	1,740
Feed in lb. per lb. gain.....	5.097	4.344	4.277

When the pigs were brought into the sty, the feed of group 1 was immediately raised to 6 lb. meal per pig per day. Groups 2 and 3 were fed less the first week as it was feared that they would not be able to clean up 6 lb. However, they ate their feed so well that it was raised to 6 lb. per pig for the second week. Until the end of the experiment the pigs were all fed at the same rate, viz. 6 lb. per pig per day. At this College bacon pigs are never fed more than 6 lb. of meal per day owing to the risk of becoming over-fat.

The results of the complete experiment were as follows:—

	Group 1.	Group 2.	Group 3.
Weight on 10 July 1944 in lb.....	274	278	281
Weight at marketing in lb.....	1,216	1,188	1,132
Increase in lb.....	942	910	851
Pig-days.....	783	825	888
Increase per pig per day.....	1.203	1.103	0.958
Feed consumed in lb.....	3,231	2,776	2,433
Feed consumed per lb gain.....	3.430	3.050	2.859

Under the Meat Control Board regulations pigs are now paid for on a warm dressed-weight basis.

The pigs in this experiment were weighed individually at the Maitland abattoir. Group 1, being rather fatter and heavier, had the highest dressing percentage. If the results of this experiment are calculated on a dressed-weight basis the figures will give a truer indication of the results of the experiment.

It is estimated that the dressed weight of the pigs would have been 70 per cent. of the live weight of the pigs at the commencement of the experiment. The final dressed-weight figures are the figures as obtained at the abattoir and, since the pigs were all 1st grade, they realized 11½d. per lb. warm dressed weight.

One pig was not slaughtered (in group 3) at the close of the experiment. Its dressing percentage has been taken as the average of the other pigs in this group.

	Group 1.	Group 2.	Group 3.
Estimated dressed weight on 10 July 1944 in lb.....	192	195	197
Actual dressed weight at abattoir in lb..	955	926	873
Dressed weight increase in lb.....	763	731	676
Feed consumed in lb.....	3,231	2,776	2,433
Feed consumed per lb. dressed weight gain	4.235	3.797	3.569

2nd Experiment.

On 9 July 1944 a Large Black gilt gave birth to 8 pigs, two of which were still-born. These pigs were sired by a Large White Boar.

As usual the sow and litter were kept in the sty and allowed out into the adjoining camp in which there was a little grazing.

At two weeks of age the sow and litter were placed in a camp where there was a good stand of lucerne and also a fair amount of Italian rye grass, kikuyu grass and other grasses and herbage. This was on the 24 July 1944. On 27 July it was decided to discontinue all feeding of concentrates and to force the sow and litter to subsist on the grazing alone. The weight of the 6 pigs at weaning was 222 lb., an average of 37 lb. per pig. The total feed fed to the sow and young pigs was only 92 lb. The weight of the young pigs was very satisfactory and there was only 6 lb. difference between the heaviest and the lightest. On the other hand, the sow was weighed on 27 July and weighed 309 lb. At weaning she weighed only 236 lb. and was very emaciated. Towards weaning time she was inclined to uproot the lucerne and to eat the roots. Although she looked after her piglings well, it was done at the expense of her own body. She had to be kept from the boar until she was in reasonable condition.

On 5 July 1944, a full sister of the above sow farrowed. She was in pig to the same Large White boar as her sister and gave birth to 10 pigs. All lived.

She received the same treatment as her sister for the first fortnight and was then placed in a lucerne camp with a good stand of lucerne. There was very little other grass or herbage in this camp. The concentrate feed given to both the sow and young pigs was raised to 70 lb. in the 3rd week and was not further increased. On 31 August the litter of 10 pigs was weaned and then weighed 349 lb., the average weight being 34.9 lb. The meal consumed by both sow and litter was 526 lb. or, after deducting the birth weight of 30 lb., 1.65 lb. of meal per lb. increase in the weight of the litter. The sow was not weighed but was in sufficiently good condition to be served immediately.

The 16 pigs were divided into 2 groups of 8 pigs each, each group being composed of 3 pigs from one litter and 5 from the other.

The 1st group was fed almost a full ration and the 2nd group was given exactly $\frac{1}{2}$ the feed given to the 1st group.

The 2nd group was returned to the camp in which the litter of 10 had been reared and which consisted almost entirely of lucerne. The 1st group was run in the camp where the litter of 6 was reared and where there was still plenty of lucerne and a certain amount of grass, etc., as described above.

The experiment started on 5 September 1944. The pigs in the second group suffered a good deal from sunscald. Whilst with their mothers they had suffered slight sunscald but, after weaning, 4 of the pigs in the 2nd group suffered very severely, one making practically no growth for 6 weeks. In two cases the ears fell off down to where the black markings commenced. In others a considerable area of white skin was shed and permanent scars remained. The sunscald areas were limited to the white parts of the body and ears. None of the pigs in the first group was seriously affected, but most of them showed slight signs of sunscald. From the rapid growth made by these pigs it is clear that they were not seriously affected. On 5 December 1944 both lots of pigs were brought into the sties for final fattening.

THE VALUE OF LUCERNE AS GRAZING FOR PIGS.

The results of the first stage were as follows:—

	Group I.	Group II.
Days in experiment.....	91	91
Live weight 5 September 1944 in lb.....	289	288
Live weight 5 December 1944 in lb.....	1,264	878
Increase in lb.....	975	590
Meal consumed in lb.....	2,688	1,344
Meal in lb. per lb. live weight increase.....	2.757	2.278
Daily gain per pig in lb.....	1.312	.810

On being brought into the sties the feed of the pigs in group I was immediately raised to 6 lb. per day. By the second week group II were also receiving 6 lb. per day.

On 3 January all the pigs in group I were marketed. None of the pigs in group II were fit. On the 23rd January, 7 of the 8 pigs in group II had reached the necessary weights and were marketed. One pig was still too light.

The result of the fattening period was as follows:—

	Group I.	Group II.
Weight, 5 December 1944 in lb.....	1,264	878
Weight at marketing in lb.....	1,603	1,515
Increase in lb.....	339	637
Pig-days.....	224	432
Increase per pig per day in lb.....	1.513	1.474
Feed in lb.....	1,368	2,272
Feed in lb. per lb. gain.....	4.035	3.567

The results of the entire experiment were as follows:—

	Group I.	Group II.
Weight at beginning of experiment in lb.....	289	288
Pig-days in experiment.....	952	1,160
Weight at end of experiment.....	1,603	1,515
Increase in lb.....	1,314	1,227
Increase per pig per day in lb.....	1.380	1.058
Feed consumed in lb.....	4,056	3,616
Feed in lb. per lb. gain.....	3.086	2.947
Dressing percentage.....	78.16	78.16

Conclusions.

Since the dressing percentage was the same in both cases, there would be no difference if compared on a dressed weight basis. In this experiment there is very little difference between the two groups in their economy of gain. This is probably due to the severe set-back the pigs in group II suffered from sunscald. It is considered that the lucerne grazing helped both groups to make very economical gains. Farmers would naturally wish to know how much the lucerne cost. This is difficult to estimate. In the western Cape Province where lucerne is grown on dry land with a view to restoring soil fertility, the yields of lucerne hay are not very high. The lucerne grazing is available in considerable quantities at certain seasons of the year and, if possible, must be marketed through some form of livestock. The feeding of pigs is one method of doing this, and it would appear from the above experiments that they can effect a substantial reduction in the amount of concentrates needed if the lucerne is available.

Fertilizing of Maize:—

[Continued from page 37.]

An application of 5 tons of kraal manure or compost per morgen yields the same crop increase as 200 lb. superphosphate per morgen.

Applications of $\frac{1}{2}$, 1, 2 and 5 tons of municipal compost per morgen together with 200 lb. superphosphate, give the same yield as superphosphate alone.

The effect of kraal manure and compost on the grain yield, is attributed mainly to the action of phosphates.

Kraal manure may to a certain extent be substituted for phosphate fertilizer, if it can be obtained cheaply.

Applications of kraal manure considerably increase the phosphoric oxide content of the grain and the citric-acid soluble phosphoric oxide in the soil.

Phosphatic fertilizing causes an increase in the phosphorus content of the grain.

Fertilizing accelerates growth and the ripening of maize.

Granular fertilizer has no better effect than fertilizer in powdered form.

All fertilized plots yield more annual weeds than the controls. This is a favourable factor in areas where the soil is subject to wind-erosion.

Acknowledgement.

The writer wishes to thank Mr. A. J. Erasmus, owner of the farm Blesbokfontein, Hoopstad, where the experiment was carried out, and the Division of Chemical Services, Pretoria, for assistance and interest shown in this work.

NOTICE.

THE first edition of the bulletin "*Vegetable Production in South Africa*" is already out of print, but copies of the Afrikaans version are still available.

The second edition in English will be available towards the end of October.

Popular Bulletins.

(1) Calf Rearing—Bulletin No. 224. Price 3d. Obtainable from the Editor, Department of Agriculture and Forestry, Pretoria.

(2) The Export of Fresh Grapes from the Union of South Africa during the Ten-year period, 1930-39—Bulletin No. 225. Price 6d. Obtainable from the Chief, Division of Horticulture, Pretoria.

(3) Soft Cheese as a Food—Bulletin No. 229. Price 3d. Obtainable from the Editor, Department of Agriculture and Forestry, Pretoria.

SHORTAGE OF TETROL.

THE Director of Veterinary Services, Onderstepoort, announces that owing to the shortage of one of the ingredients of tetrol it is at present no longer possible to prepare supplies of this remedy. In view of the prevailing war conditions, it is extremely difficult to say when supplies will be available again, but as soon as this Institution is able to resume the preparation of tetrol, the necessary notification will be given in regard to the matter.

Farmers are therefore requested not to place any further orders since any money forwarded must merely be refunded.

The Farm Home.

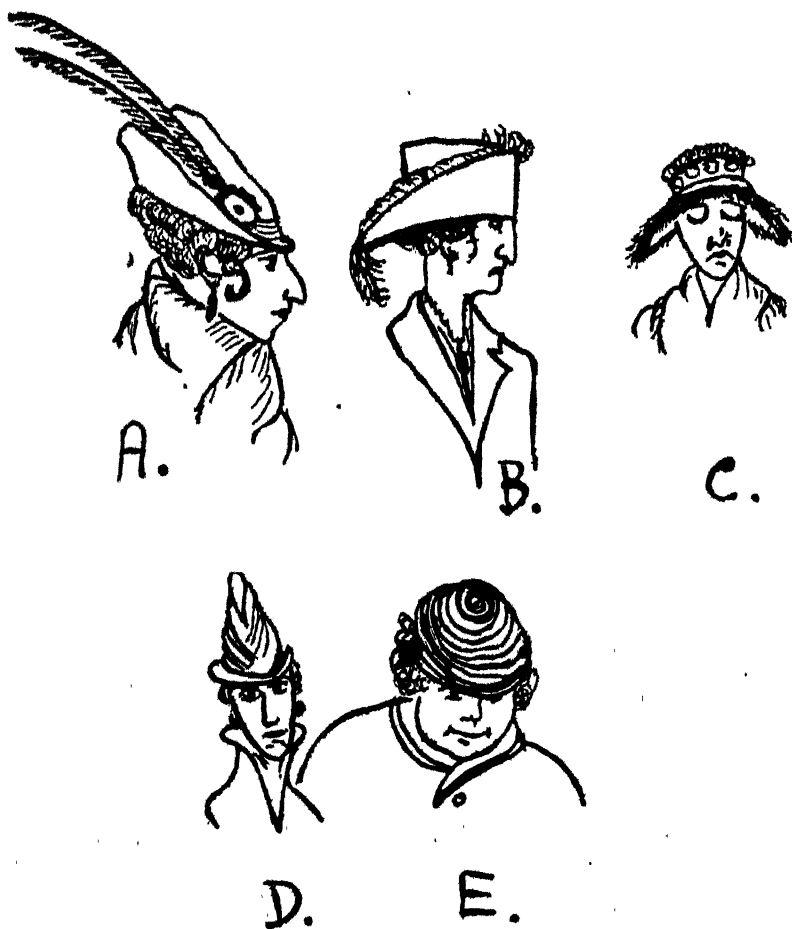
(A Section devoted mainly to the interests of Farm Women.)

Renovating Old Hats.

Misses H. van Staden, Home Economics Officer, Department of Agriculture, Pretoria, and P. J. Hattingh, Home Economics Officer, College of Agriculture, Grootfontein, Middelburg, Cape Province.

AN outfit can give complete satisfaction only if all the accessories go well together. The hair should also be arranged in such a way as to form a good frame for the face and to show up against the hat or other headgear.

How many women know how to select the right type of hat? There is such a variety of sizes and shapes to choose from, that it is



difficult to prescribe any definite rules for selecting a hat. Although personal taste will, to some extent, be the deciding factor when choosing a hat, there are a few basic principles which must be borne in mind.

A person with a long nose, for example, should not wear a long hat-feather, as in figure A, since that emphasizes the length of the nose. A perpendicular forehead and nose are accentuated by a hat with a turned-up brim as in figure B. A hat with a floppy brim, shows up the lines of the face still more (figure C). A tall, thin person must not wear a high peaked hat, as this will make the face which is already long and thin, appear even thinner (figure D), while a woman with a round, full face should not wear a brimless hat, or one with a circular crown or a round hat with a turned-up brim, since the round lines accentuate the roundness of the face (figure E). A tip-tilted nose appears to turn up even more if a hat with a round up-sweeping brim is worn. Lines in the face which are repeated in the hat are accentuated. See that you repeat only those lines, therefore, which will improve your appearance.

The type of brim which suits most people is one with irregular lines, e.g., turning up at one side and down at the other. This forms an arch, which has a very softening effect. People who wear spectacles will find that a turned-down brim not only protects the eyes against sharp light, but also softens the sharp effect of the spectacles on the face.

Turbans or brimless hats can be worn successfully only by people with very regular features, since this type of headgear leaves the entire face exposed. A small, dainty person with a wide-brimmed hat reminds one of a mushroom. In order to get the best impression of a hat in relation to the figure, it is advisable, when selecting or trying on the hat, to stand in front of a long mirror which reflects the whole figure. A small mirror in which only the face is reflected is misleading, and many a woman has come home with a purchase in which she is disappointed.

A hat should form a background for the face and should not be so large as to obscure the wearer herself. This, of course, applies to the whole outfit. Clothes must improve one's appearance and enhance all good points. They should not eclipse the personality.

The colour of a hat is also very important. It should harmonize with the rest of the outfit. Every woman soon discovers what colours suit her best. A person of very rosy complexion will not look her best in a scarlet hat as this will accentuate the ruddiness of her face. Pale-complexioned persons should not wear yellow or yellowish green, as these colours will emphasize their pallor. Let the colour of hair, skin and eyes be the guiding factors. The hat should always be of a lighter colour than the shoes or else should form a complete contrast.

Different Kinds of Hats.

Attention should also be paid to the texture of a hat. There are hats of a soft, fine flexible straw, stiff, coarse, hard straw, thin, soft felt and thick heavy, woolly felt, as well as fabric hats. Straw hats are very popular during summer while in winter preference is given to the felts. The texture of the hat should more or less match that of the material of the dress. The shape of the hat should not only be right for the particular type of face, but should also harmonize with the type of dress with which it is worn.

Straw hats are divided into two main classes, viz. genuine straw and artificial straw.

A genuine straw hat may always be recognized by the four whorls in the top of the crown. Sometimes there is only one. The thread of the straw runs diagonally across the crown. It can be compared to bias material. Genuine straw can easily be stretched over a hat block when wet, but everything depends on the kind of straw. Genuine straw is strong, wears well and can be renovated with good results.

Artificial straw can always be recognised by some sort of stitching in the crown. It either has a seam running across the centre of the crown or otherwise the entire top of the crown is an inset. The threads of artificial straw cross each other at right angles and may be compared to those of cross-grained material. The straw shows no whorl and is also very difficult to process. It becomes limp when wet and can only be pressed into shape slightly by means of a damp cloth and a cool iron. Any further attempt at alteration will be futile.

Many hats are made of long thin plaited strips of straw, stitched together by machine. It is practically impossible to reblock these strip-straw hats except by ironing them on a flat crown block. The crown is inclined to stretch in depth so that the whorl protrudes at the top. Around the base of the crown the stitching keeps the hat so firm that it is difficult to stretch it over any other type of block. While other straw hats can be blocked inside-out in order to obtain the original colour again, this cannot be done in the case of strip-straw hats, since that type of straw has a right and a wrong side.

Felt is made from wool, compressed by means of steam. It is very easy to reblock felt which may be blocked inside-out if necessary. Felt can be stretched considerably if moistened and heated. Care should be taken, however, not to tug at felt too hard since it tears fairly easily. There are different kinds of felt.

How to Renovate Old Straw Hats.

A hat is not an article which can be worn out. It is used for one or two seasons, becomes "dated" and is then put away in the back of a cupboard, only to be discarded after a number of years.

Few women have the heart to throw an old hat away but at the same time they have no use for it, not knowing how to alter and make it fashionable again. After all, one cannot buy a new hat whenever the old one is damaged by a few drops of rain or when its brim is bent, or the veiling becomes shabby or its ribbon ends frayed.

With a little trouble and attention all those old hats in your wardrobe can be renovated and worn again for a year or two. Often two old hats can be used to make a new one, especially when the material of the original hats can be cut up.

Before altering a hat, however, it should be thoroughly cleaned. First of all, remove all ribbons, linings and trimmings and brush the hat well with a stiff clothes-brush. All linings must be washed and ironed. If you decide to use the old ribbons, clean them thoroughly with benzine or soap and water and iron them well. Lace and veils can be placed in a solution of gum sugar or gelatine and water and ironed out well when they are half dry. Cut off the frayed edges. Dirty spots on a hat can be removed by rubbing lightly with methylated spirit. Consult the tables for the further treatment of different hat materials.

Material.	Cleaner.	Method.
Light felt.....	1. Sandpaper or a rubber brush 2. Warm meal/meal	Rub the hat with a circular movement outwards. Rub well into the hat. Leave for a while and then brush out. Repeat until the hat is clean.
White felt.....	Magnesia or chalk powder	Brush into the hat and brush out well afterwards.
Dark felt.....	1. Warm bran..... 2. Benzine or petrol 3. Methylated spirit	If the hat is not very dirty use meal/meal as described above. Remove stains with this and then brush it over the whole hat. Brush the hat with this, using an old toothbrush. It cleans and stiffens. Brush out with a stiff brush.
Light straw.....	1. Alcohol..... 2. Methylated spirit	Rub the whole hat with a small piece of cloth dipped in alcohol. Now apply hat varnish in order to brighten the straw. (Three parts of shellac and two parts of methylated spirit make an excellent hat varnish.) Brush methylated spirit evenly over the hat. This will give it a new appearance.
Dark straw.....	Methylated spirit...	This is a good cleaner for both light and dark hats, but not for light yellow or off-white hats. It may be used on pale blue, black, navy blue, dark red, etc., and is good for removing water stains.
Shiny black straw	Equal parts of black ink and olive oil	Apply very thinly and evenly with an old toothbrush. Polish with a soft cloth.
Leghorn straw....	Two tablespoons sulphur, mixed to a paste with lemon juice	Apply with a cloth, allow to dry, and afterwards brush off.
White straw..... (genuine straw)	Hot water and soap + oxalic acid or tartaric acid	Scrub with hot water and soap, rinse with cold water and allow to dry thoroughly while the crown is stuffed with paper, or allow to dry on a block. Now brush with one teaspoon oxalic acid in a cup of boiling water. Allow to dry on a block or stuffed with paper as before. Tartaric acid, hydrochloric acid or any diluted acid may be used, but only on genuine straw.
White Panama or other smooth white genuine straw hats	1. Salt water..... 2. Dioxogen..... 3. Magnesia powder or whiting 4. Sulphur.....	If the hat is not very dirty, brush well with a strong saline solution; this will clean and stiffen it. Also excellent for brushing hats which are not too dirty. This will bleach and stiffen it. Scrub the hat well with soap and water, first outside, then inside, working from the centre outwards. Dry as well as possible. Then apply a paste of magnesia powder or whiting. Dry in the sun and brush out. Leave on a block, or stuffed, while drying. May be applied in two ways, viz., as in the above method with the whiting, or otherwise the damp hat may be hung in a closed cupboard after being brushed with soapy water. Place \pm three tablespoons of sulphur in a tin lid near the hat in the cupboard, ignite it and close the cupboard tightly. Leave the hat in the cupboard for a few hours after the sulphur has burnt out. Sulphur bleaches white straw.

Blocking Straw Hats.

If the brim and crown have been sewn together, they may be loosened first. Where the brim and crown are in one piece, however, the crown is blocked first, after which the superfluous material is cut off together with the brim. Dip the crown in very hot water and allow to soak until the straw is wet through. Do not try to bend the straw as it breaks very easily. Pull the crown over a block immediately after having removed it from the water. Press and smooth until quite flat. See that the whorls are in the centre at the top.

At this stage the straw has a crinkly appearance. In order to get it quite smooth again, place a dry cloth over the straw and over that a damp cloth. Then iron with a hot iron. The dry cloth prevents scorching of the straw. If there is a deep fold or pleat in the crown, this can be kept in position by tightly pinning a piece of tape along it. If the brim and crown are in one piece, tie a piece of tape more or less where the crown ends so as to keep it in position. Now cut the brim off just below the band. Place the crown in the sun to dry.

The brim should be ironed on the edge of a table or on a brim block. The brim may also be soaked in hot water, but this is not always necessary. Steam the brim until the straw is soft, place it flat on the block and iron as described above.

If you want the brim to turn up at one side, steam until quite damp, place the two thumbs in the centre of the brim with their tips touching and stretch the straw by pulling the thumbs away along the brim. Repeat the process a few times until the brim has the required round shape. In order to tighten the outer edge of the brim, a strong thread may be drawn in along the edge, and for a round turned-up brim, the thread may be tightened. To iron this kind of brim well, make a tight roll of rags, place this inside the turned-up brim and iron on the other side, using a dry cloth under a damp cloth, as above. Place in the sun to dry.

Remove the hat from the block as soon as it is quite dry. White patches are sometimes found on straw hats after drying. These may be removed by rubbing with methylated spirit.

Place the crown on the head, press well into position, place the brim over it and pin them together—first in front and at the back. Then stitch the crown to the brim with a double thread, using $\frac{1}{4}$ -inch tacking stitches. The edge of the crown protruding under the brim, is cut down to $\frac{1}{2}$ inch. Fold this $\frac{1}{2}$ -inch edge back into the hat, being careful to leave no rough edges. Sew the new lining or the old one which has been washed, on to this folded edge.

If the hat is to be stained with a hat stain, usually obtainable from chemists, this should be done before the lining is sewn in.

Dilute the stain—2 parts stain to 1 part methylated spirit—and apply it evenly over the hat and inside the brim.

Take care not to stain the edge which rests on the forehead, since the stain will discolour the skin. Allow the first coat to dry well and then apply a second, in order to obtain an even colour.

Finishing Off the Brim.

There are several ways of finishing off the brim:—

1. Fold the edge of the brim over once, place a hat wire in the fold and stitch by machine. The two edges of the wire are allowed to overlap 2 inches and sewn together with blanket stitches.

2. Sew the wire to the edge of the brim, using the blanket or top-sewing stitch. Fold a half-inch corded ribbon lengthwise along its centre and iron under a damp cloth, stretching the outer edge so that the ribbon will fit round the brim. Place the edge of the brim within the fold of the ribbon, tack into position and stitch once by machine.

3. Fold the ribbon lengthwise and stretch to round form of brim. Fit the wire and then the edge of the brim in the fold of the ribbon, leaving only a small portion of the ribbon beyond the brim's edge. Tack into position and stitch.

In order to make the ribbon fit well about the crown, it should also be ironed with a hot iron under a damp cloth, one edge being stretched to give it a slight curve. If it is fitted round the crown with the wide edge downwards, the top edge will fit snugly. The ribbon also fits well if it is twisted.

If old corded ribbons are washed, they should never be rubbed. The fine creases cannot be ironed out and the ribbon loses its freshness. Dip the ribbon in lukewarm soapy water and repeatedly draw it through the fingers without crumpling it, or brush it lightly with a soft brush. Now rinse the ribbon and iron it dry under a dry cloth.

Old flowers may be restored by holding them in steam from a kettle and moulding them with the fingers.

Blocking Felt Hats.

Remove all trimmings, brush out all the dust and clean the hat well with benzine. Dip the felt in very hot water and place it over a block while still warm. The blocking process is exactly the same as in the case of straw hats. Never allow the damp ironing cloth to get dry, since that would result in shiny streaks on the felt. Instead of being ironed, the hat may be steamed to remove extra fullness.

Superfluous material from the crown which protrudes from under the brim, is cut off flush with the brim. Trimmings are arranged and sewn on as described above.

Blocks.

Hat blocks are obtainable from various firms, but they are often very expensive. Effective blocks may be made at home from papier-mâché or other mixtures which can be moulded by hand. The block should be light for easy handling.

To restore the gloss and stiffness of straw and felt hats, a varnish mixture may be applied. Straw hats should be thoroughly dried and then painted lightly with the mixture inside as well as outside. Felt hats should also be thoroughly dry, but the mixture is applied only to the inside of the crown and brim. If no varnish is available, a limp felt can be stiffened by steaming and ironing the brim on the inside under a damp cloth.

The application of these few simple processes will give an old hat a brand-new appearance and a new lease of life.

Crops and Markets

A Statistical and Economic Review of South African Agriculture

by

The Division of Economics and Markets

Vol. 24

JANUARY 1946

No. 281

CONTENTS

	PAGE
Price Review for November 1945	57
Index Prices of Field Crops and Animal Products	58
Maximum Prices of Lucerne Hay, Teff Hay and Lucerne Meal ...	58
Agricultural Conditions in the Union during November 1945 ...	59
Prices of Dairy Products, December 1945	59
Maximum Prices of Turkeys	60
Maximum Prices of Fertilisers	60
Second Estimate of Expected Winter Cereal Crops, 1945-46 Season	61
Maximum Prices of Farm Feeds	61
Maximum Prices of Eggs	62
Prices, Tables and Index	62

Price Review for November 1945.*

Fruit.—The markets were well supplied with peaches, plums and apricots which were sold at remunerative prices. Pineapples and papaws were well supplied and prices were slightly higher than during the previous month. Citrus fruit was scarce generally.

Tomatoes.—Tomatoes were fairly well supplied on all markets. Supplies were mostly from the Transvaal lowveld, and increased especially during the second half of the month.

Potatoes.—Adequate supplies of potatoes reached the markets. Consignments from the lowveld gradually decreased and towards the end of the month supplies consisted largely of locally produced potatoes.

Onions.—Onions were not so well supplied and were sold at good prices.

Vegetables.—All varieties of vegetables were fairly well supplied, except green peas, greens beans and cabbages, which were moderately supplied and sold at good prices.

Fodder.—Fodder was scarce. Teff, lucerne and oat stocks had to be rationed on the Johannesburg market. High prices were thus paid even for consignments of poor quality.

Seed and Grain.—Supplies were not large enough to meet the demand. The supply of dry peas on the Johannesburg market was higher than the previous month, with the result that the prices declined slightly.

* All prices mentioned are averages.

Eggs and Poultry.—Egg supplies declined during the month and were disposed of at satisfactory prices.

The meat scarcity resulted in the moderate poultry supply being sold at very favourable prices.

Index Prices of Field Crops and Animal Products.

THIS index, as shown elsewhere in this issue, shows a slight increase during November, viz., from 171 to 172.

Some of the groups of products, however, showed considerable changes, viz., the following:—

1. "Winter cereals" advanced from 183 to 187 as a result of higher prices for wheat and rye for the 1945-46 season.

2. "Hay" rose from 189 to 191 as a result of the drought and a general scarcity of feedstuffs.

3. "Other field crops" declined from 383 to 379.

4. "Dairy produce" declined from 210 to 204 on account of a slight reduction in the seasonal price of butterfat.

5. "Poultry and poultry products" rose from 165 to 173.

Maximum Prices of Lucerne Hay, Teff Hay and Lucerne Meal.

Lucerne hay and teff hay.—The maximum prices of lucerne hay and teff hay as fixed on 21 September 1945 (see *Crops and Markets* of November 1945) were again amended somewhat on 16 November 1945. Producer's prices remain unchanged, viz. 6s. and 5s. per 100 lb. free-on-rail producer's station for lucerne hay and teff hay, respectively, and so also the maximum prices at which a co-operative society is allowed to sell, viz. 6s. 3d. and 5s. 3d. per 100 lb. respectively, while dealers who acquired hay directly from producers may also sell at the same maximum prices, viz. 6s. 3d. and 5s. 3d. per 100 lb. for lucerne and teff hay, respectively, f.o.r. producer's station.

In other cases, except those mentioned above, the maximum selling prices have been fixed at 6s. 9d. and 5s. 9d. per 100 lb. f.o.r. producer's station for lucerne hay and teff hay, respectively. In cases where the hay is sold to consumers in quantities not exceeding 4,000 lb., the maximum selling prices have been fixed at 7s. and 6s. per 100 lb., respectively, f.o.r. producer's station.

Where lucerne hay or teff hay is purchased for resale, the actual railage not exceeding 1s. 6d. per 100 lb. from the producer's station may be added to the selling price, and where it is sold to a consumer transport costs of 1d. per 100 lb. per mile from the premises of the reseller to those of the purchaser may be added. (See *Government Gazette Extraordinary* of 16 November 1945.)

Lucerne meal.—A maximum price for lucerne meal was again introduced from 23 November 1945. The maximum price at which a manufacturer may sell lucerne meal is 8s. 9d. per 100 lb. in cases where this lucerne meal was prepared from baled lucerne hay, and 8s. 3d. per 100 lb. where it was prepared from loose lucerne hay.

The actual railage paid by the manufacturer on the lucerne hay may be added to the above-mentioned prices.

The maximum price at which any other person except a manufacturer may sell lucerne meal is 6d. per 100 lb. higher in each case than the prices mentioned above, plus a further 1d. per 100 lb. per mile transportation cost from the premises of the seller to those of the purchaser.

All prices mentioned above are for lucerne meal in bags, free-on-rail from the manufacturer's station. (See *Government Gazettes Extraordinary* of 16 and 23 November 1945.)

Agricultural Conditions in the Union During November 1945.

Rainfall.—Isolated showers bringing temporary relief fell in the Border area of the Cape Province, the Transkei, and in parts of Natal and the highveld of the Transvaal. In general, however, drought conditions still prevailed in the Union. Only in the lowveld of the Transvaal was the drought broken by good rains.

Condition of Stock.—Grazing deteriorated in general and drinkingwater became scarce. As a result of the poor condition of stock, losses occurred in some areas, as for example in the northern Cape Province, the Border area, and parts of Natal and western Orange Free State.

Winter cereals.—The October estimate for wheat, as shown elsewhere, was 3,229,000 bags for this season (1945-46) as against a crop of 3,424,000 bags (threshing results) for the previous season. Winter cereals in the western Cape Province suffered considerably from superfluous rains during the period when the crops commenced to seed. A poor crop is also expected in the Orange Free State as a result of the drought.

Summer crops.—It is still too early to predict what the 1945-46 mealie and kaffircorn crop will be. It is feared, however, that as a result of general drought conditions during November a much smaller area than usual was planted to summer cereals.

Prices of Dairy Products, December 1945.

DUE to the continuing drought in most dairy areas of the Union, the Dairy Industry Control Board has decided to pay the special winter premium on butterfat and cheesemilk, which was in effect during the month of November 1945, during the month of December 1945 as well.

During December butterfat producers will therefore receive the basic price of 1s. 11d., 1s. 9d. and 1s. 7d. per lb. for 1st, 2nd and 3rd grade, respectively, plus the special winter premium of 4d. per lb.

Similarly, producers of cheese milk will receive during December 1945 the basic price of 10½d. per gallon milk (or 2s. 4½d. per lb. butterfat contained therein), plus the special winter premium of 2d. per gallon (or 5½d. per lb. butterfat). The price which pro-

ducers of condensing milk will receive during December 1945 will also be the same as that for November 1945, viz., 13½d. per gallon or 3s. 0½d. per lb. butterfat.

After 31 December 1945, the special winter premium on butterfat and cheese milk will be discontinued and the price of condensing milk will be fixed at 11½d. per gallon (or 2s. 7½d. per lb. butterfat.)

Maximum Prices of Turkeys.

THE maximum wholesale and retail prices of turkeys in the Union remain unchanged, viz. as follows.

	Maximum Wholesale Price per lb. Nett.	Maximum Retail Price per lb. Nett.
	s. d.	s. d.
(1) Ex cold storage—		
Dead weight, plucked only.....	1 7	1 11
Dead weight, prepared in any manner other than plucked only.....	1 8	2 0
(2) Not ex cold storage—		
Live bird.....	1 2	1 4
Dead bird plucked only.....	1 7	1 9½
Dressed bird, feet and head removed.....	1 9½	2 0½
Dead bird whether plucked or not and/or dressed or prepared in any other manner.....	1 2	1 4
Kosher-killed turkeys stamped to that effect.....	*	*

* The relevant price as above plus 3d. per bird.

The above prices include delivery to the purchaser and apply to sales by auction as well as to other sales.

(See *Government Gazette Extraordinary* of 23 November 1945.)

Maximum Prices of Fertilizers.

THE following are the fixed maximum prices for the different kinds of fertilizers:—

	Maximum Price per 2,000 lb. (Bagged).
	£ s. d.
Superphosphate, 19 per cent.....	7 13 0
Superphosphate, 18 per cent.....	7 5 0
Superphosphate, 17.1 per cent.....	6 17 6
Superphosphate, 15.1 per cent.....	6 1 6
Phosphate rock and superphosphate mixture.....	6 1 6
Nitrate of ammonia.....	28 0 0
Muriate of potash.....	21 11 6
Ammonium sulphate.....	20 0 0
Ammonium phosphate.....	23 6 0

The above prices are cash with order and are free-on-rail seller's station.

CROPS AND MARKETS.

These prices remain unchanged, as fixed on 9 February 1945.

The only change is that maximum prices of ammonium sulphate and ammonium phosphate of which supplies were unobtainable previously, have now also been fixed. Consumers are, of course, still allowed a subsidy of £1 per ton on the above prices.

The maximum prices of "Langfos" rock phosphate has been increased as from 30 November 1945 from 63s. per ton f.o.r. buyer's station to 75s. per ton. The increase is mainly due to the fact that the cost of the bags is now included in the price.

On the above-mentioned price a farmer will receive a subsidy of 10s. per ton.

(See *Government Gazette Extraordinary* of the 30 November 1945.)

Second Estimate of Expected Winter Cereal Crops 1945-46 Season.

ACCORDING to conditions prevailing towards the end of October 1945 and on the strength of reports received from crop correspondents, the Division of Economics and Markets estimates the 1945-46 wheat, oat, barley and rye crops on European farms in the Union to be as follows:—

	October Estimate.	September Estimate.
Wheat (bags of 200 lb.)—		
Cape Province.....	2,474,000	2,589,000
Orange Free State.....	319,000	408,000
Transvaal.....	436,000	448,000
UNION.....	3,229,000	3,445,000
Oats (bags of 150 lb.).....	2,126,000	2,208,000
Barley (bags of 150 lb.).....	669,000	649,000
Rye (bags of 200 lb.).....	237,000	278,000

Soyabean Production 1944-45 season.—On the basis of information received by the Division of Soil Conservation and Extension from its extension officers, as well as information furnished by the most important millers and crop correspondents, the present soyabean crop has been estimated at between 12,000 and 15,000 bags (of 200 lb.) in comparison with the previous year's estimate of 12,000 bags.

The main producing areas are the eastern highveld of the Transvaal, the coastal area of Natal, and the eastern coastal area of the Cape Province where the rainfall is evenly distributed and favourable for the growing period of soyabeans. Most farmers produce soyabeans mainly as forage for which purpose it is thought to be excellent and is mostly fed in the form of hay or silage.

Maximum Prices of Farm Feeds.

THE prices of all registered farm feeds, as well as of all farm feed mixtures and any locally produced animal or vegetable protein feeds, have been frozen at the October 1945 levels. The regulation fixing the maximum prices of all poultry food at the June 1944 levels (see *Crops and Markets*, October 1944) is hereby withdrawn.

Maximum Prices of Eggs.

THE maximum wholesale and retail prices of eggs in the controlled areas as fixed on 28 September 1945 (see *Crops and Markets*, November 1945) have been increased by 3d. per dozen for all grades, as from 30 November 1945, and are now as follows:-

	MAXIMUM PRICES, PER DOZEN.	
	Wholesale.	Retail.
	s. d.	s. d.
Grade I—		
Extra large.....	2 2	2 5
Large.....	2 0	2 3
Medium.....	1 10	2 1
Small.....	1 8	1 11
Grade II—		
Large.....	1 10	2 1
Medium.....	1 8	1 11
Small.....	1 6	1 9
Grade III—		
Mixed.....	1 7	1 7

(See *Government Gazette Extraordinary* of 30 November 1945.)

Index of Prices of Field Crops and Animal Products.

(Basic period 1936-37 to 1938-39 = 100.)

SEASON (1 July to 30 June).	Summer Cereals.	Winter Cereals.	Hay.	Other Field Crops.	Pastoral Products.	Dairy Products.	Slaughter Stock.	Poultry and Poultry Products.	Com- bined Index.
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	
WEIGHTS.	19	13	2	3	34	6	17	6	100
1938-39.....	92	107	96	89	79	102	106	92	93
1939-40.....	86	107	77	95	115	105	106	89	103
1940-41.....	109	113	106	156	102	108	110	101	104
1941-42.....	121	134	143	203	102	131	134	145	123
1942-43.....	160	149	144	159	122	147	167	173	146
1943-44.....	169	172	137	212	122	154	182	204	157
1944-45.....	184	183	160	280	122	177	172	187	163
1944—									
January.....	168	183	137	179	122	144	183	215	154
February.....	168	183	134	188	122	144	176	235	154
March.....	167	183	124	170	122	144	174	240	157
April.....	167	183	132	262	122	144	170	279	162
May.....	183	183	153	289	122	169	166	273	167
June.....	182	183	170	315	122	169	161	250	166
July.....	182	183	147	317	122	195	163	187	163
August.....	182	183	147	343	122	195	170	190	163
September.....	182	183	160	393	122	195	175	164	166
October.....	182	183	170	391	122	195	176	170	167
November.....	182	183	136	295	122	169	183	172	162
December.....	183	183	145	270	122	159	170	195	163
1945—									
January.....	184	183	177	250	122	159	173	206	163
February.....	184	183	171	235	122	180	171	225	164
March.....	184	183	182	245	122	180	171	237	165
April.....	184	183	173	246	122	180	169	263	166
May.....	199	183	173	287	122	184	163	272	170
June.....	199	183	190	320	123	184	169	262	172
July.....	199	183	191	315	118	210	174	210	170
August.....	199	183	191	333	118	210	178	180	169
September.....	199	183	187	372	118	210	182	165	170
October.....	199	183	189	383	118	210	186	165	171
November.....	199	187	194	379	118	204	180	173	172

(b) Maize and kaffircorn.
(c) Wheat, oats and rye.
(d) Lucerne and vetch hay.

(d) Potatoes, sweet potatoes,
onions and dried beans.
(e) Wool, mohair, hides and skins.

(f) Butterfat, cheese milk and
condensing milk.
(g) Cattle, sheep and pigs.
(h) Fowls, turkeys and eggs.

CROPS AND MARKETS.

Prices of Bananas and Pineapples on Municipal Markets.

SEASON.	BANANAS (Per Crate) (a)			PINEAPPLES. (b)							
	Cape Town.	Johannesburg.	Pretoria.	Cape Town. Box.	Durban. Doz.	Johannesburg.		Port Elizabeth. Box.	East London. Doz. Large.	Bloemfontein.	
						Ordinary. Doz.	Queens and Giants. Doz.			Doz. Bushel.	Box.
1938-39.....	s. d. 22 5	s. d. 9 10	s. d. 16 5	s. d. 5 4	s. d. 3 3	s. d. 1 1	s. d. 4 8	s. d. 3 5	s. d. 1 2	s. d. 4 10	s. d. 4 9
1939-40.....	24 4	8 7	15 10	6 1	3 10	1 4	4 8	3 10	1 5	4 9	4 9
1940-41.....	27 0	7 2	14 3	5 10	2 8	1 5	2 1	4 5	1 5	5 10	5 10
1941-42.....	25 6	7 6	14 6	6 6	3 0	1 7	2 5	4 6	1 8	6 2	6 2
1942-43.....	30 0	11 0	22 7	7 4	3 0	1 8	3 10	4 11	2 1	7 3	7 3
1943-44.....	37 8	13 2	18 10	8 3	3 6	2 4	2 1	6 3	2 10	8 4	8 4
1944-45.....	—	—	—	10 4	3 9	2 6	3 9	7 3	3 3	8 6	8 6
1944—											
January.....	32 4	12 0	—	8 3	1 8	1 7	3 4	8 8	2 3	6 1	6 1
February.....	28 6	9 0	20 6	4 9	1 8	1 0	1 0	4 4	2 3	4 5	4 5
March.....	38 8	16 1	17 3	7 8	2 9	1 6	1 4	3 9	3 9	5 5	5 5
April.....	46 11	16 7	22 10	6 9	4 3	2 4	—	5 1	1 11	7 0	7 0
May.....	35 1	11 2	21 0	7 9	5 11	2 10	1 11	7 1	2 1	7 7	7 7
June.....	34 5	9 9	13 9	10 0	3 1	3 6	3 1	6 8	2 9	11 6	11 6
July.....	28 1	12 5	18 1	9 0	3 3	3 10	3 6	10 1	2 6	10 1	10 1
August.....	33 3	16 3	14 8	8 0	2 8	4 5	4 7	9 6	3 4	9 9	9 9
September.....	36 10	12 6	17 8	15 4	1 11	5 9	5 7	17 4	3 3	11 7	11 7
October.....	38 3	21 10	23 3	20 6	5 9	7 1	7 6	18 6	3 8	23 2	23 2
November.....	48 0	18 10	21 10	16 10	6 4	5 7	9 1	17 2	3 8	16 2	16 2
December.....	46 7	15 8	19 8	12 3	—	3 10	4 1	11 9	8 2	13 8	13 8
1945—											
January.....	31 9	12 11	14 0	7 7	—	1 4	2 2	6 3	2 4	6 3	6 3
February.....	32 8	13 5	16 7	5 11	—	1 5	1 3	5 4	2 7	6 11	6 11
March.....	27 1	13 7	14 8	6 3	—	1 7	2 5	4 11	4 7	5 6	5 6
April.....	34 11	14 10	17 4	7 4	—	2 2	3 5	5 9	2 11	6 4	6 4
May.....	30 11	10 3	13 7	8 4	2 9	3 5	2 10	9 4	2 7	8 2	8 2
June.....	31 5	9 4	12 6	8 10	2 7	5 4	5 9	10 9	4 4	8 6	8 6
July.....	33 11	10 6	19 4	13 2	2 5	7 1	5 6	17 7	3 5	15 3	15 3
August.....	38 1	16 1	16 4	12 9	4 1	5 4	5 9	13 8	3 3	13 11	13 11
September.....	53 7	20 3	13 1	11 7	8 3	5 9	6 2	10 4	5 0	15 8	15 8
October.....	70 8	41 1	33 4	13 1	10 7	7 6	5 8	16 0	4 6	14 1	14 1
November.....	68 0	32 4	25 1	10 10	10 9	4 5	5 0	12 4	4 10	13 6	13 6

(a) Season 1 January to 31 December.
(b) Season 1 October to 30 September.

Prices of Avocados and Papaws on Municipal Markets.

SEASON.	AVOCADOS (Per Tray). (a)				PAPAWS. (b)						
	Cape Town.	Durban.	Johannesburg.		Cape Town Std. Box.	Durban. Tray.	Johannesburg.		Port Elizabeth Std. Box.	Bloemfontein Std. Box.	
			Ordinary.	N.M.			Ordinary Std. Box.	N.M. Std. Box.			
1938-39.....	s. d. 1 6	s. d. 0 11	s. d. 1 3	s. d. 1 11	s. d. 2 0	s. d. 0 10	s. d. 1 7	s. d. 2 0	s. d. 2 0	s. d. 1 8	
1939-40.....	2 1	1 2	1 9	2 11	2 3	0 10	1 4	1 9	1 11	1 6	
1940-41.....	1 10	0 10	1 5	2 4	2 1	1 1	1 9	2 2	2 3	1 9	
1941-42.....	2 4	1 7	2 1	3 4	2 5	0 10	1 10	2 1	1 11	2 0	
1942-43.....	3 1	1 8	2 10	4 3	3 2	1 2	2 1	2 7	2 2	2 0	
1943-44.....	4 1	1 6	3 7	5 3	3 2	1 5	2 5	3 5	3 3	2 7	
1944-45.....	—	—	—	—	3 4	1 6	3 1	4 1	3 5	3 0	
1944—											
January.....	5 0	3 0	4 8	6 8	3 4	1 1	2 1	3 1	2 8	2 7	
February.....	2 5	1 7	3 1	4 0	1 10	2 4	4 11	5 1	—	2 10	
March.....	2 5	1 8	2 9	4 6	5 4	1 9	6 3	7 3	—	3 10	
April.....	2 7	1 0	2 9	4 3	4 9	1 4	4 7	5 2	4 9	4 3	
May.....	3 6	1 7	3 8	5 1	3 7	1 9	4 5	4 4	4 4	3 8	
June.....	6 5	1 10	5 8	6 11	3 11	1 1	2 10	3 8	3 0	2 3	
July.....	4 10	—	6 4	6 1	2 6	1 6	3 3	4 4	2 7	2 11	
August.....	7 9	6 6	6 2	6 11	2 10	1 7	3 4	4 5	3 3	3 0	
September.....	9 6	2 0	6 7	6 3	4 0	1 0	2 11	3 6	3 2	3 2	
October.....	9 0	—	8 0	9 1	3 4	1 3	3 8	4 7	4 6	3 11	
November.....	7 9	—	4 11	5 5	3 5	2 0	1 11	3 2	3 0	2 11	
December.....	7 5	3 11	7 10	7 6	3 7	2 3	2 8	3 5	7 5	2 3	
1945—											
January.....	3 11	—	4 10	7 2	3 10	1 5	4 1	4 9	6 5	3 6	
February.....	2 0	2 3	2 6	4 3	2 8	1 10	5 11	7 6	—	5 5	
March.....	2 0	0 11	2 3	4 4	4 10	1 10	5 4	6 9	—	4 10	
April.....	1 10	0 10	2 7	3 11	4 9	1 8	4 5	6 2	4 11	4 6	
May.....	2 4	0 9	2 5	4 3	4 7	1 6	3 7	5 0	4 7	2 11	
June.....	2 4	2 5	2 10	6 1	4 4	1 11	3 7	4 6	4 0	3 6	
July.....	3 4	2 4	3 10	5 8	4 2	1 9	4 10	5 9	4 11	5 0	
August.....	6 8	3 10	6 2	7 4	5 10	1 5	4 10	6 1	5 3	5 0	
September.....	5 4	3 1	6 5	7 0	3 3	1 4	3 3	4 1	2 7	3 6	
October.....	7 2	3 8	8 1	7 4	2 7	1 5	2 5	3 5	2 2	2 4	
November.....	9 5	3 6	6 6	8 0	3 6	2 0	2 7	3 7	6 7	3 2	

(a) Season 1 January to 31 December.
(b) Season 1 April to 31 March

Average Prices of Onions and Sweet Potatoes on Municipal Markets.

SEASON (1 July to 30 June).	ONIONS (120 lb.).						Sweet Potatoes (120 lb.).		
	Johannesburg.		Cape Town.	Pretoria.	Durban.				
	Trans- vaal.	Cape.	Cape.	Cape.	Local.	Cape.	Johan- burg. Table.	Durban.	Cape Town.
1938-39.....	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1939-40.....	8 3	8 10	7 4	7 10	8 6	9 6	5 7	4 8	5 3
1940-41.....	6 3	9 10	7 3	9 11	9 8	10 5	5 7	5 9	5 0
1941-42.....	12 5	12 3	9 10	11 11	11 2	12 7	7 3	6 4	5 5
1942-43.....	10 6	13 11	10 4	13 10	13 0	14 3	9 10	7 1	8 4
1943-44.....	13 8	14 0	12 6	14 7	12 9	14 5	9 8	8 1	8 5
1944-45.....	16 2	18 9	15 1	17 4	19 1	19 2	12 0	10 9	10 7
1944-45.....	14 7	18 7	14 8	18 1	18 8	19 5	17 3	15 1	16 3
1944—									
January.....	11 3	10 9	8 8	12 3	9 6	11 7	14 2	9 4	11 10
February.....	12 7	14 0	7 10	11 7	12 9	13 9	15 8	10 10	11 6
March.....	14 4	14 10	11 1	15 0	13 5	15 1	12 11	8 6	10 10
April.....	16 6	16 11	13 7	17 0	14 0	18 2	12 6	8 8	9 8
May.....	17 2	19 10	15 6	19 7	20 3	21 7	12 3	13 5	9 6
June.....	26 1	21 11	18 8	23 2	22 2	22 11	16 2	14 9	11 1
July.....	14 9	21 6	18 6	21 2	24 5	23 11	16 10	12 4	11 2
August.....	14 2	21 7	17 11	22 8	23 7	23 5	20 8	22 3	18 10
September.....	23 3	27 10	22 0	26 7	27 8	26 7	20 4	20 2	23 6
October.....	10 11	21 0	22 11	19 10	24 0	24 5	20 2	24 11	25 2
November.....	11 0		13 8		14 7	12 9	23 11	11 3	11 7
December.....	14 10	17 0	15 6		23 4	21 9	20 4	10 11	18 0
1945—									
January.....	12 9	13 1	9 11	14 8	12 3	13 5	18 2	7 8	11 7
February.....	13 5	13 10	9 9	10 4	12 2	14 0	16 0	8 1	10 8
March.....	13 10	15 2	11 4	14 9	18 9	17 0	12 6	9 6	12 5
April.....	17 8	17 5	14 6	16 9	12 6	17 8	9 11	7 5	9 1
May.....	16 4	17 11	12 0	18 0	19 11	20 10	10 4	7 1	11 4
June.....	20 3	17 11	14 4	18 4	15 4	18 1	9 4	8 2	9 4
July.....	16 7	18 7	15 5	16 8	17 7	20 5	10 4	8 8	12 4
August.....	18 7	14 4	15 7	18 3	16 9	19 4	11 3	8 9	12 1
September.....	16 1	17 7	16 1	19 11	16 3	20 6	15 0	12 11	14 2
October.....	10 8	14 5	12 11	14 8	10 4	15 10	19 0	15 0	17 0
November.....	12 3	9 3	13 0		11 3	13 10	19 11	19 1	21 3

Average Prices of Lucerne, Teff, Kaffircorn and Dry Beans.

SEASON AND MONTH (b).	LUCERNE (per 100 lb.).			Teff Johan- nesburg (a) 100 lb.	KAFFIRCORN in bags (200 lb.).		DRY BEANS (200 lb.) bags.		
	Johannesburg (a).		Cape Town 1st grade.		F.o.r. Producers' Stations.		Johannesburg (a).		
	Cape.	Trans- vaal.			K1.	K2.	Speckled Sugar.	Cow- peas.	Kid- ney.
1938-39.....	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1939-40.....	3 10	3 1	4 0	2 7	13 1	12 9	25 0	18 9	24 2
1940-41.....	3 0	2 5	3 4	2 6	8 8	9 4	21 11	13 11	21 2
1941-42.....	4 2	3 5	4 3	3 3	15 6	17 0	30 0	16 8	27 11
1942-43.....	5 7	5 2	5 8	4 7	18 10	19 6	32 10	19 8	28 3
1943-44.....	5 5	6 0	7 4	5 5	24 10	24 10	34 0	25 8	24 2
1944-45.....	5 4	5 6	7 3	4 5	21 0	21 7	49 6	20 11	32 1
1944-45.....	6 4	5 4	7 2	4 9	18 8	18 8	88 7	39 6	70 6
1944—									
January.....	5 0	3 7	7 0	5 10	20 3	20 5	62 4	25 11	35 2
February.....	5 2	3 8	7 0	4 5	18 10	19 2	58 1	23 4	30 11
March.....	4 11	3 8	7 3	3 8	17 9	18 0	62 6	35 8	36 6
April.....	5 3	4 6	7 2	3 9	17 9	17 7	71 6	34 9	44 0
May.....	6 4	3 9	7 3	4 4	18 0	18 6	71 8	37 11	54 5
June.....	6 9	5 6	7 5	4 11	16 10	16 10	96 1	42 0	78 10
July.....	5 9	4 11	7 6	4 7	16 2	16 2	92 3	42 0	64 8
August.....	5 10	4 10	7 7	4 3	15 2	15 2	84 10	38 6	75 3
September.....	6 8	4 2	6 0	5 0	15 5	15 5	97 10	34 2	78 5
October.....	6 10	6 9	7 3	4 6	16 7	16 7	102 8	33 4	72 2
November.....	5 8	4 5	6 3	4 4	16 6	16 6	101 6	39 2	81 9
December.....	5 9	6 1	7 0	4 3	17 9	17 9	112 9	41 0	87 2
1945—									
January.....	7 8	5 7	7 3	4 1	23 1	23 1	118 8	45 11	98 2
February.....	7 0	6 9	7 6	—	22 0	22 0	122 3	45 3	95 3
March.....	7 2	5 10	7 8	5 5	22 0	22 0	107 9	42 11	89 3
April.....	6 10	—	7 8	5 2	22 0	22 0	199 11	53 4	104 8
May.....	6 9	5 7	7 6	5 5	20 6	20 6	111 1	61 7	97 1
June.....	7 6	6 9	7 9	5 8	20 6	20 6	102 2	67 11	95 2
July.....	7 6	—	7 9	5 9	20 6	20 6	105 8	67 1	80 10
August.....	7 6	—	7 9	5 9	20 6	20 6	98 7	66 8	80 7
September.....	7 4	—	7 9	5 9	20 6	20 6	87 0	67 2	74 6
October.....	7 5	7 6	7 0	5 9	20 6	20 6	91 2	70 8	68 8
November.....	7 6	6 9	—	6 8	20 6	20 6	106 3	68 7	79 1

(a) Municipal Market.

(b) Seasonal year for Kaffircorn,
1 June-31 May.

Dry Beans, 1 April-31 March;

Lucerne and Teff, 1 July-30
June.

CONTENTS



	PAGE
EDITORIAL:	
Post-War Agriculture	69
 FIELD HUSBANDRY:	
The Production of Seed Potatoes (P. C. de Villiers)	71
A Successful Farm Demonstration (E. Adler)	92
Peach Mildew (A. J. Louw)	93
 SPECIAL:	
Greater Agricultural Production: Larger Units or Higher Productivity? (Dr. F. R. Tomlinson)	75
 POULTRY:	
Newcastle Disease of Poultry (J. D. W. A. Coles)	100
Feather Picking and Cannibalism in Poultry (E. C. Sanders)	111
 MISCELLANEOUS:	
Lamsiekte Vaccine now Available	70
Land Prices in the Orange Free State (J. C. de Klerk)	104
D.D.T. (R. du Toit)	113
 THE FARM HOME:	
How to Make Bound Buttonholes and Set-in Pockets (Miss Lena van Staden)	117
CROPS AND MARKETS	121

[Photo on Cover: U. J. van Rensburg.]

[NOTE.—Articles from *Farming in South Africa* may be published provided acknowledgment of source is given.]

FORD'S FOR SEEDS—A. FORD & Co. (Pty.) Ltd.
AGRICULTURAL SEEDSMEN.

SEED CONTRACTORS TO THE UNION GOVERNMENT,

P.O. BOX 5701.

CATALOGUES FREE

JOHANNESBURG.

Information on Departmental Publications.

Farming in South Africa, the monthly journal of the Department, contains popular as well as scientific articles on a variety of agricultural topics, useful to both the farmer and the housewife, while the **Crops and Markets** Section supplies information on crop prospects, market prices and exports of agricultural produce.

The following particulars in regard to subscriptions and advertisements should be noted:—

Subscription.—Within the Union, South West Africa, Bechuanaland Protectorate, Southern Rhodesia, Swaziland, Basutoland, Mocambique, Angola, Belgian Congo, and British Territories in Africa, 5s. (otherwise 7s. 6d.) per annum, post free, payable in advance.

Applications, with subscriptions, to be sent to the Government Printer, Bosman Street, Pretoria.

Advertisements.—The Tariff for Classified Advertisements is: 2d. (two pence) a word with a minimum of 5s. per advertisement (prepaid). Repeats, not entailing any change in the wording, will be published at half the cost of the original.

Conditions:—

- (1) The advertisement will be classified under specific headings, and only one black letter (initial letter) is permitted.
- (2) Advertisements in which prices are mentioned must contain the name and address of the advertiser. A nom-de-plume or box number only is not sufficient, and unless this condition is strictly observed, advertisements will not be accepted.
- (3) Advertisements will be classified strictly in accordance with the subject-matter of the announcement, determined by the first item mentioned and cannot be inserted under irrelevant headings.
- (4) Displayed, classified advertisements will also be accepted. The charge, however, will be 10s. per inch, single column, per insertion, without reduction for repeats.

Copy for Advertisements to be in the hands of the Government Printer, Pretoria, not later than the 20th of the month preceding publication.

Send all advertisements direct to the Government Printer, or write to him for details as to tariff for advertisements.

Popular Bulletins.—Bulletins on various agricultural topics are published by the Department to meet public demand. A list of available bulletins giving particulars of cost, etc., is obtainable free of charge from the Editor, Department of Agriculture, Pretoria.

Scientific Publications.—From time to time the different Divisions of the Department issue science bulletins incorporating the results of research work conducted by them. Other scientific publications issued are: "The Onderstepoort Journal", "Memoirs of the Botanical Survey of South Africa", "Bothalia", "Entomological Memoirs" and the "Annual Reports of the Low Temperature Research Institute". Information in regard to these publications is obtainable from the Editor, Department of Agriculture, Pretoria.

Press Service.—The Press of South Africa is now supplied with a bulletin of agricultural information for their exclusive use. This information is published fortnightly by all newspapers and other journals throughout the country.

Farmers' Radio Service.—In addition to the printed information supplied by the Department to members of the farming community, the Department, in collaboration with the South African Broadcasting Corporation, also maintains a daily broadcasting service to farmers. Information in regard to times of broadcasting is contained in the programmes issued by the Broadcasting Corporation.

Inquiries.—All general inquiries in regard to the publications of the Department, including the Radio Service, should be addressed to the Editor, Department of Agriculture, Pretoria.

D. J. SEYMORE, Editor.

COURSES OF TRAINING IN AGRICULTURE, 1946.

at

THE COLLEGES OF AGRICULTURE

at Middelburg, Cape Province; Potchefstroom, Transvaal; Cedara, Natal; Glen, Orange Free State; Stellenbosch-Elsenburg, Cape Province.

SPECIAL COURSES:

- (1) At the Grootfontein College of Agriculture, Middelburg, Cape Province.

Special Three-months' Sheep and Wool Courses.

Inclusive fee: £12.

Minimum entrance qualifications: Std. 7 and one year's experience of sheep farming.

First Course..... 27 February to 29 May 1946.

Applications close on 6 February 1946.

Second Course..... 3 July to 2 October 1946.

Applications close on 12 June 1946.

- (2) At the College of Agriculture, Potchefstroom, Transvaal.

Special Courses in General Agriculture.

These consist of a series of short courses covering the main and subsidiary aspects of farming in summer-rainfall areas.

Duration 10 weeks: Inclusive fee: £15.

First series..... 7 January to 15 March.

Second series..... 1 April to 7 June.

(NOTE.—See also under short courses).

Special Course in Grain Grading.

Inclusive fee: £6.

Students taking this course qualify for the Grain Graders' Certificate.

Duration: 4 weeks from 11 February to 8 March 1946.

- (3) At the College of Agriculture, Glen, Orange Free State.

Special Three-months' Sheep and Wool Course.

Inclusive fee: £12.

Minimum entrance qualifications: Std. 7 plus one year's experience of sheep farming.

Duration: 5 February to 8 May 1946.

Special Courses in Grain Grading.

Duration: 3½ weeks.

Inclusive fee: £5. 5s.

Students taking this course can qualify for the Grain Graders' Certificate.

First Course..... 3 to 26 April 1946.

Second Course..... 6 to 30 August 1946.

- (4) At the College of Agriculture, Cedara, Natal.

Special Senior Diploma Course.

Inclusive fee: £36.

This course is restricted to ex-volunteers desirous of completing courses interrupted by the war.

Duration: 40 weeks: From 28 January to 12 December 1946.

Special General Farming Courses.

Inclusive fee: £12.

First Course (Elementary)..... 4 March to 26 April 1946.

Second Course (Advanced)..... 6 May to 28 June 1946.

Third Course (Elementary)..... 6 August to 27 September 1946.

Fourth Course (Advanced)..... 8 October to 29 November 1946.

The First and Third of the above courses are suitable for those with little or no practical farming experience. The Second and Fourth courses are more advanced and are planned for those with previous farming experience.

SHORT COURSES:

These will be held as shown below.

<i>College and Course.</i>	<i>Duration.</i>	<i>Fee.</i>
Grootfontein College of Agriculture.		
1. Karoo Farming (Merino and Mutton Sheep Crops and Veld).....	6 to 19 February.....	£ s. d. 3 0 0
2. Farm Workshop (Practical).....	9 to 22 October.....	3 0 0
3. Horticulture, Dairying, Pigs and Poultry.....	9 to 22 October.....	3 0 0
4. Dairy Cattle, Draft Horses, Pigs, Veld Management and Crops.....	23 October to 5 November	3 0 0
5. Farm Workshop (Practical).....	13 Nov. to 26 Nov.....	3 0 0
6. Dairy Cattle, Draft Horses, Pigs, Crops and Veld Management.....	13 Nov. to 26 Nov.....	3 0 0

Glen College of Agriculture.

1. Farm Engineering.....	18 February to 1 March.....	3 0 0
2. Field Crops and Horticulture.....	4 to 15 March.....	3 0 0
3. Cattle, Pigs and Dairy Farming.....	18 to 29 March.....	3 0 0
4. Cattle, Pigs and Dairy Farming.....	13 to 24 May.....	3 0 0
5. Farm Engineering.....	27 May to 7 June.....	3 0 0
6. Poultry.....	10 to 21 June.....	3 0 0
7. Cheesemaking.....	8 to 19 July.....	3 0 0
8. Poultry.....	8 to 19 July.....	3 0 0
9. Milk Testing.....	22 to 26 July.....	1 10 0
10. Poultry.....	2 to 13 September.....	3 0 0
11. Farm Engineering.....	16 to 27 September.....	3 0 0
12. Judging of Friesland Cattle.....	To be announced later.....	1 10 0
13. Judging of Afrikaner Cattle.....	To be announced later.....	1 10 0

Potchefstroom College of Agriculture.

	<i>Duration.</i>	<i>Fee.</i>
1. Animal and Field Husbandry.....	7 January to 8 February.....	7 10 0
2. Farm Management.....	11 to 22 February.....	3 0 0
3. Poultry Husbandry.....	25 February to 8 March.....	3 0 0
4. Horticulture.....	11 to 15 March.....	1 10 0
5. Animal and Field Husbandry.....	1 April to 3 May.....	7 10 0
6. Farm Management.....	6 May to 17 May.....	3 0 0
7. Poultry Husbandry.....	20 May to 31 May.....	3 0 0
8. Horticulture.....	3 to 7 June.....	1 10 0

The above courses will be repeated during August to December 1946 if the demand warrants such a step.

Stellenbosch-Elsenburg College of Agriculture.**At Elsenburg.**

1. Dairy and Pig Farming.....	24 to 28 June.....	1 10 0
2. Viticulture.....	24 to 28 June.....	1 10 0
3. Poultry.....	1 to 5 July.....	1 10 0
4. Horticulture.....	1 to 5 July.....	1 10 0
5. Vegetable Production.....	2 to 6 December.....	1 10 0

At Stellenbosch.

6. Home Economics.....	24 to 28 June.....	0 5 0*
7. Grain Grading.....	24 June to 5 July.....	0 10 0*

* NB.—Fees at Stellenbosch are for tuition only. Students must arrange for their own accommodation.

GENERAL:

1. Preference will be given on all courses to ex-volunteers.
2. Accommodation at Colleges is limited and early application is recommended. Where a closing date for application is not stated, applications must reach the Principal 14 days before the course begins.
3. Women are not admitted to the Two-year Diploma Course but, subject to accommodation being available, may be accepted for other courses.
4. Applications should be addressed to the Principal of the College concerned.
5. Ex-volunteers may apply through their local D.S.D.C. for financial assistance, adequate to meet the cost of the training.
6. If applications are received from more ex-volunteers than can be accommodated on any course, selection will be done in consultation with the D.S.D.C.'s at Potchefstroom, Cedara, Middelburg (Cape), and Bloemfontein.
7. All fees except for courses at Stellenbosch, include board and lodging as well as tuition.

FARMING IN SOUTH ... AFRICA

Vol. 21

FEBRUARY 1946

No. 239

Editorial :

Post-War Agriculture.

THE years of war through which South Africa has passed, and the serious drought which followed, have been a cause of brain-racking to almost everyone concerned with the agricultural industry. On all sides the question is being asked: What policy should be adopted in agriculture, with a view to the future?

An analysis of the position in South Africa before the war, reveals the existence, then, of a surplus of agricultural products such as butter, cheese, eggs, maize, etc. Steps were taken at the time to export the surpluses, or rather so-called surpluses. During the war, with the attendant increased purchasing power of the population, it very soon became apparent that there were no surpluses of the abovementioned products and that adequate supplies of all foodstuffs for the proper feeding of the nation were not being produced in South Africa. In other words, there were no real surpluses, and the increased purchasing power proved that certain products were actually in short supply. It was found, for instance, that the production of dairy products was inadequate and the state has granted permission for the manufacture of margarine, a substitute for butter. At an early date it became apparent that there was also a serious shortage of maize and, in order to meet the requirements of the population, the use of maize for the feeding of animals was restricted. As a result of this step, the supplies of other foodstuffs, such as meat and dairy products, were diminished still further and the position went from bad to worse. As a result of the serious drought which prevailed practically throughout the country until early this year, prospects are far from bright at present.

In view of these unfavourable conditions, it is clear that we are called upon to be extremely economical in the use of foodstuffs, on the one hand, and to do everything in our power to increase production as far as possible, on the other.

From the foregoing it will be deduced that agricultural products, and especially foodstuffs, will have to be produced in greater quantity in order to provide for the needs of the country. Various questions will, however, be raised in connection with such a policy, amongst others, whether the demand for and purchasing power to buy these products will continue, what measures are to be taken to increase production, and whether it will be possible to make the production of these products profitable?

In an article on "Greater Agricultural Production", appearing in this issue, Prof. Tomlinson makes a careful analysis of certain aspects of production and the points stressed by him deserve the serious attention of every agriculturist. He points out that this country will continue to develop in the field of mining, industry and commerce, for a considerable time to come. This means that the urban population will expand and that this expansion will be accompanied by the development of the native.

The result will be an increased demand for food and other agricultural products, and he comes to the conclusion that, apart

from short-term deviations, a growing demand for larger supplies of food and agricultural products to meet the domestic requirements of the country is to be expected for the next half-century at least.

In regard to the measures to be taken to increase production, attention is directed in the first place to the numerous farms in South Africa which are allowed to lie unproductive, mainly for speculation purposes, and those which owing to their size, cannot be fully utilized by the farmer. It is obvious that, in the interests of the country and the people, some scheme will have to be devised for the more effective utilization of such land.

Furthermore, and this point cannot be too strongly emphasized, the level of productivity per unit must be raised. It must be pointed out that higher yields can be obtained by adopting better farming practices, for instance better cultivation of the soil, the use of better seed, more effective eradication of weeds, more extensive use of fertilizer in the case of agricultural crops and improved feeding and care of stock. Agronomists are agreed that the average maize yield, which amounts to about 4.8 bags per morgen on the farms of Europeans, can be considerably increased. The level of productivity of most agricultural products is extremely disappointing and leaves much to be desired. Yet all research has shown that, within certain limits, an increase of the yield per unit results in a decrease in production costs. Prof. Tomlinson stresses this point in his analysis and draws the conclusion that, taking the position generally, there is still ample scope for further intensification of practically all agricultural production in South Africa, before the limit is reached beyond which a further increase in the yield per unit would, for economic reasons, be unprofitable for the farmer.

Everyone must fully realize that we are facing an extremely difficult period. An earnest appeal is, therefore, made to the population to support the State along the lines indicated, in order to enable the nation to surmount these difficulties.

(Prof. H. B. Davel, Agricultural Research Institute.)

Lamsiekte Vaccine now Available.

LAMSIKTE vaccine will be on sale at Onderstepoort from January 1946. The stock of vaccine is small, so that there is no possibility of meeting all needs. For the time being, vaccine will only be sold for the inoculating of pregnant lactating cows, and for horses. Vaccine can therefore not yet be sold for sheep and goats.

Orders must be for a minimum of five doses. For larger quantities multiples of five doses will be supplied and charged for. This will continue until suitable containers have been obtained which will permit a wider range of packing.

Farmers are asked to exercise patience, as the vaccine is being issued before the factory has reached full production. This is being done to help those whose need is pressing. It is hoped that full production will be reached shortly, but this depends largely on the arrival of equipment from overseas.

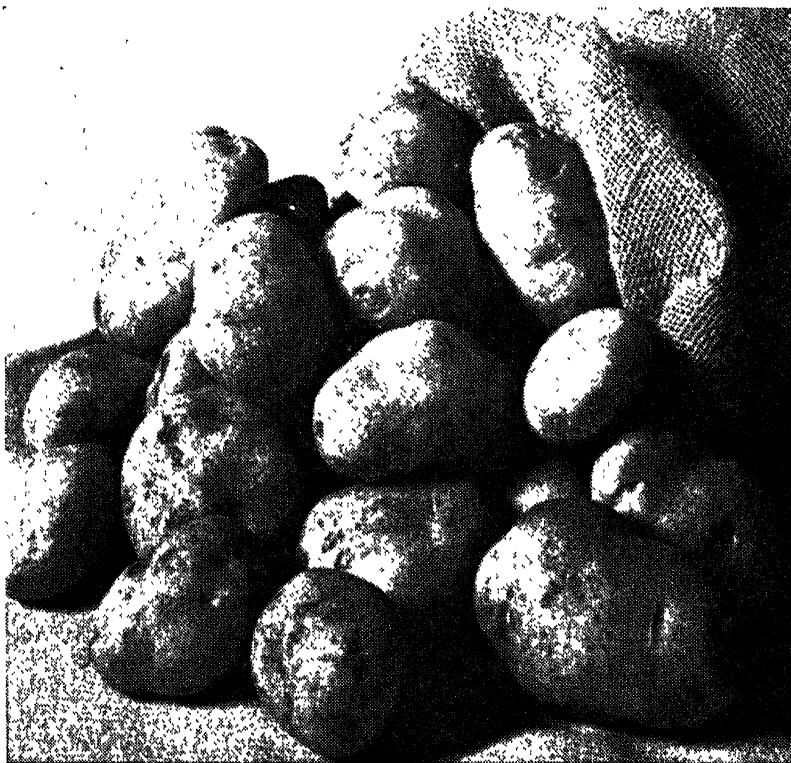
WARNING.

N.B.—The vaccine does not protect stock against aphosphorosis. If bonemeal feeding in phosphorus deficient areas is stopped, farmers can expect loss in vigour, fertility, growth and constitution in their animals which will become more susceptible to various stock diseases such as verminosis, and some may even contract stiffness (lamsiekte).
(Director of Veterinary Services.)

The Production of Seed Potatoes.

P. C. de Villiers, Extension Officer, Pietersburg.

IN the same way as the stud breeder is not to be regarded as an ordinary stock farmer, but as a specialist who is well-informed on the breed characteristics, origin, breeding qualities, food and housing requirements of his animals, the seed-potato grower can claim to be no ordinary potato farmer, but a specialist.



Good and healthy seed potatoes.

The cultivation of good tubers is a comparatively new venture in South Africa, which has developed by leaps and bounds, especially during the past war years. Owing to restricted shipping space, the importation of tubers from the cool highlands of Scotland, Ireland, Canada, etc., was limited to a minimum. In order to meet the Union's demand for seed potatoes, we had, therefore, to utilize our own highlands. Some of our most important eastern mountain ranges like the Drakensberg, Soutpansberg, etc., rise to two thousand feet and more above the warm low-veld areas in which they lie. Along the spurs and on the highest slopes of these mountains, the cool, moist climate largely satisfies the requirements for successful seed-potato growing. In other seed-potato producing countries, experience has shown that potatoes degenerate least and the best tubers can be produced in isolated high-lying areas with a cool, humid climate and a well-distributed, regular rainfall of more than 40 inches per year.

Requirements.

In such areas of South Africa, more than 30 seed-potato growers' associations have already been formed. The members plant only tubers which have been certified by the Department of Agriculture. During the growing season the potatoes are inspected at least three times and after the crop has been lifted, the final inspection of the tubers takes place. If the field has conformed to the prescribed standards during all the inspections, the tubers are certified.

The requirements are as follows:—

- (1) The tubers must be true to type and sound;
- (2) the lands must be well cultivated and clean and the plants vigorous growers;
- (3) all plants on the land must be free from virus diseases such as leaf curl, mosaic, wildings, etc.;
- (4) the crop must be completely free from bacterial wilt;
- (5) the soil must be free from eelworm;
- (6) there must be no volunteer plants on the land;
- (7) the crop must be rogued at an early stage by removing the undesirable plants complete with tubers;
- (8) the site of the crop for certification must be at least 100 yards removed from other potatoes;
- (9) the tubers must be free from late blight, black leg and other wilts like *Fusarium* and *Rhizoctonia*.

In addition, at the final inspection the tubers:—

- (1) Must not show more than 5 per cent. scab;
- (2) must be free from late blight, black leg and eelworm;
- (3) must exhibit none of the following in the bag: rot, moth infestation, deformities and damage; in addition, the skins must be firm. A minimum of internal brown fleck is allowed.

If the inspector and the secretary of such an association are satisfied that the inspection standards have been met, a departmental certificate, signed by both the secretary and the departmental inspector, is placed in each bag, after grading for size. The bags are then sealed by the secretary and offered for sale at a fixed price. Certified seed potatoes are sold only by the secretary of the association concerned. The potatoes are sold in new bags on which the name of the association appears.

Points to be Noted.

The cultivation of good seed potatoes is a task for an expert who must carefully study and comply with the following requirements. . .

(1) *Source of Seed*.—Only sound tubers, showing no signs of degeneration, and obtained from a known source, must be planted. The best and most economical tuber size ranges from 1½ to 4 oz. Smaller tubers can be planted successfully, provided they are obtained from sound seed-potato plots where strict and intensive selection has been applied from the start, i.e. where all stunted and poorly growing plants have been removed at an early stage together with the tubers. Such degenerate plants tend to yield only small, inferior potatoes which in turn repeat the process, to the detriment of the grower. In practice, therefore, no tubers weighing less than 1½ oz. are planted.

Tubers weighing 4 oz. and more can be cut up into pieces of adequate size, containing two or more eyes each. The tubers should be cut at planting time and it is unnecessary to dip the cut surfaces into lime or sulphur. In order to prevent evaporation, the tubers

should not be cut through completely. The cut portions should still adhere. The person planting the potatoes can then just break each tuber up into its segments and plant each piece immediately. Best results are obtained with cut tubers if they are planted in moist soil containing sufficient humus and plant food. If, owing to circumstances, the cut tubers have to be planted in comparatively dry soil, each piece should be allowed to develop a natural corky layer on the cut surface. This can be done by storing the pieces in a single layer in a cool, well-ventilated place for 8 to 10 days before planting.

If tubers have to be stored before planting, it is highly desirable to allow them to green in a cool, light, moth-proof room or store. After that they can be stored in long heaps, not more than two feet high, and well covered with grass or straw as a protection especially against the tuber moth. The potatoes may also be stored in well-ventilated boxes stacked in a moth-proof, well-ventilated storeroom. Regular inspection is essential in order that all bad, decayed tubers may be removed. Tubers which have been greened beforehand will develop short, thick sprouts. The best yields are obtained from tubers from which the sprouts have not been removed. For best results, sprouts should not be broken off. Should the weather delay planting to such an extent that it becomes necessary to break off the sprouts, this should be done at least two weeks before planting.

Tubers can be forced to sprout by storing them in a warm place or by exposing them to the action of carbon bisulphide or calcium carbide. There are risks attached to both these methods, and it is essential to obtain full information from the Department of Agriculture before applying them.

(2) *Soil and tillage*.—The best soils for the production of seed potatoes are the well-drained, sandy loam types of good depth, especially if the soil is virgin soil which has been tilled. Such soils are not, however, of general occurrence, and for this reason growers in suitable climatological areas should study their soil and endeavour to approach the ideal type as closely as possible by thorough cultivation and fertilization. Light, sandy soil should receive reasonably heavy applications of kraal manure, compost and other humus-forming material. Green manuring, undecomposed compost and kraal manure should be ploughed into heavy loam soils some considerable time before the potatoes are planted.

It should be remembered that the potato plant has a weak root system, that the tubers are enlarged underground stems or stalks and that soil which is too heavy or compact retards the growth and expansion of the tubers. On the other hand, very sandy soil which has received generous applications of fertilizer, promotes excessive growth and the production of large tubers which are undesirable from the point of view of the seed-potato grower, whose aim it is to grow as many well-set, sound and growth-producing tubers of the desired size. The climate, soil structure and available plant-food should be such that the desired results can be obtained. The latter two factors are within the control of the judicious grower.

(3) *Fertilization, rotation and tillage*.—As has already been mentioned, the seed-potato grower must have a sound knowledge of his soil, and cultivate and fertilize it accordingly. In order to produce sound tubers, the potato plant should be able to absorb sufficient plant food of the correct type from the soil. In the same way as the dairy cow converts her balanced ration into milk, the potato plant converts plant-food into good tubers. Moreover, it is an indisputable fact that well-nourished plants are more resistant to pests and disease.

The average loam soil requires from 15 to 20 tons of well-sweated kraal manure per morgen, ploughed in at least a month or two before planting. At the time of planting from 900 to 1,400 lb. of F mixture or some other suitable fertilizer, according to the soil requirements of the area, should be applied in the rows in such a way that the fertilizer will not come into direct contact with the tubers.

The potatoes are planted in rows 2½ feet to 4 feet apart. In the rows the spacing is from 12 to 18 inches. Immediately after planting the land is harrowed to a fine tilth. After the plants have come up the field is again harrowed and thereafter cultivated regularly to keep the soil loose and free from weeds. Sloping lands are cultivated and planted on the contours. In areas where tuber moth infestation is severe, the potatoes should be ridged at an early stage.

Since potatoes are subject to many diseases and pests, the best and soundest tubers are grown in well-prepared virgin soil, and in order to continue growing good seed potatoes a well-devised system of crop rotation must be applied for the control of eelworm and the maintenance of soil fertility.

Oats may be sown during winter, before the potatoes are planted. During summer, the potato crop may be followed by maize for grain or silage. After a year, potatoes may again be planted, followed by a permanent pasture grass such as *Paspalum dilatatum* for three or four years, after which the grass may be ploughed under and potatoes planted once more.

The pasture grasses may include clovers, which will thrive in the above-mentioned high-rainfall areas. The seed-potato producer should also include livestock in his system of farming, in order to obtain kraal manure and compost with which to build up and enrich his soil still further, and to stabilize his farming.

(c) *Control of disease.*—The foregoing are measures which will contribute considerably towards the prevention of disease, but there will be times when diseases will have to be controlled by direct means. Tubers which are subject to common scab or *Rhizoctonia* can be treated with formalin and commercial preparations like Aretan before planting. Late blight (*Phytophthora infestans*) should be controlled in good time either by dusting or by spraying the plants with Bordeaux mixture or other copper sulphate-lime mixtures. This treatment yields better results if applied before there are any signs of late blight, being a preventive measure rather than a cure. Where late blight does occur, the grower should do everything in his power to control it, since it is liable to make his crop unfit for use as seed potatoes, especially if the blight penetrates to the tubers.

Lifting.

Potato tubers are not mature before the foliage has died completely. As long as there is any greenness in the foliage, development and growth are taking place in the tubers. In actual fact, the tubers fill out most during the last two or three weeks.

If the grower becomes anxious to lift his crop or is afraid that the tubers may be growing too large for seed purposes, he can remove the foliage before it is dead. Holding the soil down with the feet on both sides of the plant, it is possible to pull out the foliage without seriously disturbing the tubers. After this, the rows should be ridged well to keep out the tuber moths. Ten to fourteen days later, that is to say when the skins are firm, the potatoes may be lifted.

When seed potatoes are being lifted and throughout the process of sorting and packing, the tubers must be handled practically as care-

Greater Agricultural Production.

Larger Units or Higher Productivity?

Dr. F. R. Tomlinson, Agricultural Research Institute, Pretoria.

THE demand for both food and feeds has, for various reasons, greatly increased in South Africa. During the post-war period many of the factors responsible for the high demand will disappear, and, consequently, the present high demand will decline to a large extent, due to the decreased purchasing power.

From the national economic point of view, however, there is one important factor, which should not be lost sight of, namely, that our country is still, and will be for many years to come, in a developmental stage in the field of mining, industry, and trade. This means that the urban population will expand still further and that this expansion will be accompanied by an increase in the total requirements of food and other agricultural products. Industrial expansion is accompanied by an increase in the urban native population, which also has an important effect on demand. During the coming half century, our agriculture can expect, apart from short-term deviations, an increased pressure for greater food production for local consumption.

The expected increasing demand can only be satisfied in three ways, namely, (a) keeping local production at a constant level and increasing imports, (b) keeping the normal pre-war imports constant and increasing local production, and (c) increasing both local production and importation. It depends mainly on Government policy which of these three directions will be followed. Undoubtedly the increase in local production will play an important rôle in satisfying the long-term increasing demand.

Further Expansion or Greater Productivity?

In order to satisfy the increasing demand, the individual farmer can obtain a greater physical output in two ways. Firstly, he can expand his area under cultivation in the case of field and fruit crops, and increase the size of his herds and/or flocks in the case of live-stock products. Secondly, the farmer can follow a policy of obtaining higher yields per unit, e.g. bags of grain or tons of hay per morgen, number of eggs per hen, gallons of milk per cow, etc.

In South Africa there are thousands of uneconomic farm units on which the owners are unable to make a reasonable living. On these uneconomic units a too small net income is obtained on which a reasonable standard of living can be maintained. The net income (gross income less expenses) on the uneconomic farm unit is also detrimentally affected by the fact that the farmer cannot obtain the optimum efficient use of his capital goods (buildings, other improvements, implements, draught animals, etc.) and labour. Such uneconomic farms are a social-economic liability to the country. In this analysis, when the view-point of greater intensification is supported, the term "small farms" should not be interpreted as meaning uneconomic units.

Maize and wheat are our two most important food crops. For the two years 1943-44 and 1944-45 the averages of the area sown, total production and yield per morgen (Europeans only) were⁽¹⁾:—

	Maize.	Wheat.
Area planted or sown (morgen).....	3,346,000	1,234,000
Total production (bags).....	15,976,000	4,807,000
Yield per morgen (bags).....	4.8	3.9

The average yields per morgen speak for themselves, even without comparison with other maize- and wheat-producing areas in the world. (The yields during the war years were, of course, adversely affected by the lack of fertilizer, but even before the war these two maize per morgen was obtained in the well-known Unit Experiment of the area under these two crops, within the limits of the areas where they should be produced, is still physically possible. This is especially true of maize. But should further expansion be undertaken in marginal areas, an increase in the total supply may be expected, but with a declining trend in the yield per morgen and consequently at an increased real cost per bag.

From the agronomic point of view it is quite possible to obtain higher yields on the greater part of our present crop lands. During the past two years (1943-44 and 1944-45) an average of 29.2 bags of maize per morgen was obtained on the well-known Unit Experiment at the Agricultural Experiment Station of the University of Pretoria. With large-scale production it is unlikely that such high yields will be obtained in practice, mainly because the skill required to achieve similar results would be lacking over large areas. There is no doubt, however, that the low average yield of 4.8 bags maize per morgen on all European farms in this country could be considerably increased by the application of better farming practices.

Even if we accept the fact that further expansion of crop area will not take place in marginal and sub-marginal areas, the possibility still remains, and it will happen too, that such expansion will take place within the boundaries of the proper crop areas. Enlargement of uneconomic farms is definitely necessary. The question which should be answered, however, is *whether greater agricultural production should be obtained through further expansion on the present level of low productivity, or by means of increased productivity*. In choosing a course to follow, the basic agricultural viewpoint and the social economic view-point (especially the size of the farming population), as well as the individual farmer's view-point, should be considered. In this analysis direct attention will be given to the position of the individual farmer, although the other aspects will not be lost sight of. *It should be stressed, however, that the economic position of the individual farmer should be taken into serious consideration in any national claims on agriculture as a whole.*

Size Factor and Financial Success.

During the past 15 to 20 years various economic studies have been made of some of our most important agricultural products, and the results obtained can to a large extent throw some light on the problem under review. These studies show very clearly that, as the size of the farm increases, the financial result improves. There are two important reasons behind this relationship, namely, (a) that in general as the size of the farm increases a more productive use is made of the capital goods and labour supply, and (b) that on the larger farms a higher turn-over (gross income) is obtained, which, even at the same profit per unit of product, increases the total profit on the farm. In the case of smaller farms which are above the economic minimum a fairly reasonable productive use is made of the capital and labour. The turn-over on such smaller farms [factor (b) above] can be enlarged by increased yields per unit of area or per animal unit, thereby increasing the financial result.

The figures in Table 1 are a general example of the favourable influence of the size-factor on the financial result(*).

GREATER AGRICULTURAL PRODUCTION.

TABLE 1.—*Influence of area under crops (size factor) on operator's earnings (financial result), average per farm, Springbok Flats.*

AREA UNDER CROPS (MORGEN).		Operator's earnings. (£).
Groups.	Average.	
150 and less.....	121	109
151 to 250.....	206	259
251 to 350.....	296	407
More than 350.....	453	697

The Springbok Flats is an important crop area in the Transvaal, with peanuts and maize as the main products. The results in Table 1 reveal that the operator's earnings show an increased trend as the area under crops increases.

The same positive relationship is found in the maize-producing area of the Orange Free State (see Table 2). In this case the total area of the farms is taken as the size factor because the income from livestock constitutes an important part of the total farm income.

TABLE 2.—*Influence of total area per farm (size factor) on operator's earnings (financial result), average per farm in the maize districts of the Orange Free State⁽³⁾.*

AREA OF FARM (MORGEN).		Operator's earnings. (£).
Groups.	Average.	
Less than 400.....	269	179
400 to 699.....	547	234
700 to 999.....	845	249
1,000 to 1299.....	1,034	386
1,300 and more.....	1,972	888*

* The large increase in operator's earnings from £386 to £888 is probably due to the large increase in area in the last group.

The same positive relationship is found between size and financial result of the farm as a whole in the case of intensive irrigation farming in the western Transvaal where the production of tobacco is the main enterprise. This is shown in Table 3.

TABLE 3.—*Influence of area under tobacco (size factor) on the operator's earnings (financial result), average per farm, western Transvaal irrigation area⁽⁴⁾.*

AREA UNDER TOBACCO (MORGEN).		Operator's earnings. (£).
Group.	Average.	
Nil.....	Nil	—46
0.1 to 1.5.....	0.8	—34
1.6 to 3.0.....	2.7	6
3.1 to 4.5.....	4.0	40
4.6 to 6.0.....	5.2	117
More than 6.....	8.1	241

Various other types of farming can be illustrated, and the same positive result between the size factor and financial result is found in general.

It should be pointed out at this stage that of the more or less 100,000 farms in the country, only a relatively small percentage can be termed "very large" or "large". The majority of our farms are on the small side, but nevertheless represent economic units. From the practical point of view it is impossible for all farmers to operate "large farms", and thereby make use of the size factor to improve the financial result. A large but economically sound farming population is a national asset; a reduction of the number of farm families, with the exception of those on uneconomic units, would therefore not offer a practical solution to the problem.

Size Factor and Cost of Production.

It is clear from the above few analyses that in general an increase in the size of the farm causes an improvement in the financial result of the farm as a whole. In order to determine whether more economical production takes place as the farm increases in size, further analysis is necessary. In other words, it should be determined whether costs of production per unit decline if more morgen are put under crops and more animal units are kept. Theoretically this should be the case, but in certain areas no such relationship is found and in other areas the effect of the size factor on production costs is very small.

Various studies have shown that in South African agriculture yields obtained on various sizes of farms in the same agricultural area show no significant difference. This does not mean that larger yields are not obtained on some large farms than on some smaller farms, and *vice versa*. No trend is found, however, in yields per unit as the size factor increases. The most important data to support this statement are taken from the Agricultural Census Report of 1936-37 on maize farming⁽⁵⁾. These are analyzed in Table 4⁽⁶⁾.

TABLE 4.—Area, production and yield per morgen maize, average per farm, 22 highveld maize districts.

AREA UNDER MAIZE (MORGEN).		Number of farms.	PRODUCTION OF MAIZE (BAGS).	
Group.	Average.		Per farm.	Per morgen.
1 to 25.....	14.1	3,482	98	7.44
26 to 50.....	40.3	4,594	275	7.18
51 to 75.....	64.3	2,842	459	7.49
76 to 100.....	90.0	2,996	630	7.31
101 to 150.....	130.7	2,497	935	7.52
151 to 200.....	184.1	1,431	1,330	7.52
201 to 250.....	235.4	520	1,755	7.79
251 to 300.....	290.1	452	2,095	7.59
More than 300.....	468.9	599	3,736	8.22
TOTAL OR AVERAGE.....	83.8	19,413	608	7.58*

* 1936-37 was an exceptionally favourable year, hence the high average yield per morgen.

If, for various reasons, the first three groups (those up to 75 morgen under maize) are eliminated, it is found that the average

yield per morgen in the case of the last three groups (those having the largest area under maize) is only about 5 per cent. higher than the average yield in the case of the groups having from 76 to 200 morgen under maize. In the case of this large maize-producing area one can conclude that the area under maize per farm has practically no effect on the yield per morgen. A similar analysis as shown in Table 4 can be made for wheat with a sample of 9,274 farms⁽⁵⁾. Such analysis will have little value, however, because too many incomparable wheat-producing districts were included in the sample by the Office of Census and Statistics. The result will be influenced especially by the wheat yields on small irrigation farms.

Nearly all farm-organization studies undertaken in South Africa show also that the size factor and yield per unit factor are not really positively correlated. See, e.g., the following references: wheat⁽⁷ and ⁸⁾, maize⁽² and ⁹⁾, peanuts⁽²⁾. Unfortunately the relationship between these two factors in the case of citrus and deciduous fruit farming has not been analyzed in the many studies in connection with these farming types. The problems in connection with such an analysis in the case of deciduous fruit farming are, however, quite obvious. In tobacco production under irrigation in the western Transvaal, however, the yield per morgen increases with an increase in the area under tobacco⁽⁴⁾. This is to a large extent due to a poorer water supply on the farms with a small area under tobacco as compared with the other farms. To a small extent a similar relationship is found between area under wheat and yield per morgen in the same area⁽⁴⁾.

It will be shown at a later stage of this analysis that yield per morgen is one of the most important factors affecting production costs per unit of product. It has also been shown above that in the case of some of our most important products there exists no positive relationship between the size factor and yield per unit factor. In illustrating the effect of the size factor on production costs in the following few analyses, the influence of the yield factor is therefore automatically eliminated.

TABLE 5.—*Relationship between area under peanuts and cost of production per bag, Springbok Flats⁽²⁾.*

AREA UNDER PEANUTS (MORGEN).		Number of farms.	Bags per morgen.	• PRODUCTION COSTS.	
Groups.	Average.			Per morgen (£).	Per bag (sh.).
50 and less.....	39	31	10.5	3.5	6.61
51 to 100.....	74	39	11.8	3.3	5.66
101 to 150.....	128	16	11.6	3.2	5.48
More than 150.....	217	14	10.6	3.3	6.18

Table 5 shows that in the case of peanuts no positive or negative relationship exists between area under the crop and production costs per unit. The somewhat lower costs of production in the case of the two middle groups are only due to the slightly higher yields per morgen in comparison with the first and last groups.

The area-cost relationship in the case of maize in the Orange Free State is shown in Table 6⁽³⁾.

TABLE 6.—*Relationship between area under maize and cost of production per bag, Orange Free State.*

AREA UNDER MAIZE (MORGEN).		Number of farms.	Bags per morgen.	PRODUCTION COSTS.*	
Groups.	Average.			Per morgen. (£).	Per bag. (sh.).
Under 50.....	34	14	8·6	3·28	7·6
50 to 125.....	87	60	6·4	2·28	7·1
125 to 199.....	133	39	7·4	2·02	5·5
200 to 274.....	219	22	6·3	1·94	6·2
275 to 349.....	302	9	7·8	2·28	5·8
350 and more.....	482	21	7·6	2·32	6·1

* Production costs per bag were not shown in the original table and consequently were computed by the author.

Also in this case no definite relationship exists between these two factors. The group of largest farms has a lower average cost of production than the group of smallest farms, but the relationship does not hold throughout.

This relationship was analyzed but not published in the case of citrus farming. It was found, however, that area under citrus had no effect on production costs⁽¹⁰⁾.

Various economic studies of dairy farming have already been undertaken, although intensive analysis was applied in very few cases. In a study of fresh-milk production near Johannesburg no positive or negative relationship was found between the size of the dairy herds and production costs per gallon⁽¹¹⁾. This is shown in Table 7.

TABLE 7.—*Relationship between number of cows per herd and cost of production per gallon milk, Witwatersrand.*

NUMBER COWS PER HERD.		Gallons per cow.	Cost of production. (pence).
Groups.	Average.		
Less than 50.....	33	385	14·52
50 to 100.....	77	503	12·14
More than 100.....	148	505	13·77

The results in Table 7 show that the larger herds have a lower average cost per gallon than the group of smallest herds. In the latter case the high cost per gallon is due more to the low milk yield per cow than to the size factor.

In the Swartland wheat-producing area of the western Cape Province it was found that the area under wheat had a great influence on the cost per bag. This is one of the most settled farming areas in the Union where wheat has for many years been the chief farming enterprise. For various farm economic reasons, which need not be gone into, this relationship is quite understandable.

In a previous wheat study no relationship was found to exist between area under wheat and cost of production per bag in both the Swartland and Bredasdorp wheat-producing areas⁽⁸⁾. The results of

GREATER AGRICULTURAL PRODUCTION.

TABLE 8.—*Relationship between area under wheat and cost of production per unit, Swartland wheat-producing area*(⁷).

AREA UNDER WHEAT (MORGEN).		Number of farms.	Bags per morgen.	PRODUCTION COSTS.	
Group.	Average.			Per morgen. (£).	Per bag. (sh.).
125 and less.....	91	25	8·3	8·1	20·0
126 to 175.....	151	39	7·3	6·9	17·6
176 to 225.....	199	26	7·3	6·6	15·6
More than 225.....	295	32	8·0	5·7	13·4

the latest study (1939-40) (⁷) are accepted as giving a truer reflection of the relationship than the results of the first study(⁸) which covered the years 1929-30 to 1931-32, especially because farming in the Swartland probably became more uniform and stabilized during the ten-year period between the two studies.

To summarize at this stage, it can be stated that in the case of our most important agricultural products, with a possible exception of tobacco, the size of the farm enterprise has no definite relationship with yields per unit. In practice more or less similar yields per unit are obtained on both small and large farms in the same homogeneous agricultural area. It can be stated further that the size of the enterprise has little or no effect on lowering the production cost per unit. In the case of wheat farming in the established Swartland area the size of the wheat enterprise has a greater effect on production costs per unit than in the case of any other product. It can be expected that, although small, a more and more favourable relationship between the size factor and production costs will arise, as farming types and farming practices become more stabilized in the various homogeneous agricultural areas, and as the speculative element in our agriculture disappears.

Productivity and Cost of Production.

The results of economic studies in connection with South African agriculture indicate throughout that an increase in yield per unit affects the financial result of the farm as a whole very beneficially. The yield factor has a much greater effect even than the size factor(²). In this analysis, however, attention will only be given to the effect of yield per unit on the costs of production of individual products. Throughout, a strong decline in cost of production is found as the yield per unit increases.

An increase in yield per morgen under the same rainfall and soil conditions is an indication of greater intensification. Such increase in yields can, of course, be obtained in various ways, chiefly by means of better cultivation, better seed, increased application of fertilizers, eradication of weeds, etc., in the case of crops, and by means of better feeding and other factors in the case of livestock production. The way to obtain higher yields is a technical problem in which agronomy and animal husbandry experts give the necessary lead.

Economically, intensification, i.e. increasing yields per unit, can be pushed to such a level that it will not pay the individual farmer to aim at the maximum physical yield. The theoretical basis for this statement will, however, not be discussed further. In general, however, the practical conclusion can be drawn that in South African agriculture there is still a great possibility for further intensification

before a level is reached where a further increase in yields per unit is physically possible but economically not justifiable.

The reaction of many readers will be: "Give me the required rainfall and the higher yields will follow automatically". It is certainly true that rainfall is one of the most important physical factors affecting the total production of field crops, and it may even result in the crop being a total failure. But in the same homogeneous agricultural area with a fairly constant rainfall during any particular season over the whole area and with a fairly uniform soil type, it is found that yields per morgen vary greatly from farm to farm. The fact may be mentioned that in the year 1936-37 an average of only 75 lb. fertilizer was applied per morgen of crops on 21,606 farms in the main maize belt of the Union.

In the case of a few important agricultural products in the Union a few examples will be given to indicate the important effect of yield per unit on cost of production per unit.

The first study in South Africa to show the effect of yield per morgen on cost of production was already undertaken in the years 1921-22 and 1922-23^(12 and 13). Although graphically well illustrated, the results were not properly analyzed in tabular form to be taken over in this article.

Table 9 shows the yield-cost relationship in connection with maize production on the Springbok Flats⁽²⁾.

TABLE 9.—*Relationship between yield per morgen of maize and cost per unit, Springbok Flats.*

YIELD PER MORGEN (BAGS).		Number of farms.	Morgen of maize.	COST OF PRODUCTION.	
Group.	Average.			Per morgen (£).	Per bag (sh.).
2.5 and less.....	1.4	19	150	1.34	18.62
2.6 to 5.0.....	3.9	23	145	1.71	8.80
5.1 to 7.5.....	6.5	19	129	1.83	5.60
7.6 to 10.0.....	8.9	10	149	1.94	4.38
More than 10.0.....	12.2	15	105	2.63	4.30

Although the figures are not identical, a similar relationship is found in connection with maize production in the Orange Free State⁽⁹⁾.

In Table 10 is shown the yield-cost relationship in connection with wheat production in the Swartland area⁽⁷⁾.

TABLE 10.—*Relationship between yield per morgen of wheat and cost per unit, Swartland.*

YIELD PER MORGEN (BAGS).		Number of farms.	COST OF PRODUCTION.	
Group.	Average.		Per morgen (£).	Per bag (sh.).
6.5 and less.....	5.5	25	5.46	20.0
6.6 to 8.0.....	7.3	25	6.52	18.4
8.1 to 9.5.....	8.7	42	7.00	18.0
More than 9.5.....	11.5	30	7.74	13.4

GREATER AGRICULTURAL PRODUCTION.

In another wheat study a similar relationship was found for both the Swartland and Bredasdorp wheat-producing areas⁽⁸⁾. The same type of relationship was found in connection with peanut production⁽²⁾.

Various studies on tobacco farming also show a strong decline in cost of production with increasing yields. An example of this relationship is given in Table 11 in the case of the production of Virginia tobacco under dry-land conditions in the northern Transvaal⁽¹⁴⁾.

TABLE 11.—*Relationship between yield per morgen of tobacco and cost per unit, Limburg area.*

YIELD PER MORGEN (lb.).		Number of farms.	COST OF PRODUCTION.	
Group.	Average.		Per morgen. (£)	Per lb. (pence)
500 and less.....	293	5	7.1	5.8
501 to 1,000.....	875	6	9.7	2.7
1,001 to 1,500.....	1,362	12	12.5	2.2
More than 1,500.....	1,761	6	12.8	1.7

Because of the smallness of the sample much scientific value should not be attached to the relationship in Table 11.

A cost study of tobacco production was also undertaken in the western Transvaal irrigation area. No relationship is shown in the study between yield per morgen and cost per unit, but a strong positive relationship is shown between yield per morgen and profit per morgen⁽¹⁵⁾. Profit per unit is also influenced by the price received, but it can be concluded from the study that a strong relationship exists between yield per morgen and cost per unit.

Yield per morgen apparently has a strong influence on cost of production per unit in the case of Turkish tobacco farming in the western Cape Province⁽¹⁶⁾. The total sample in this study is fairly large, but due to the small number of farms in most of the groups no scientific conclusions can be drawn from the relationship.

A preliminary cost study of soybean production was made in 1939 and 1940 when soybean production was still undertaken by few farmers and on a small scale. Only 14 farms were included in the study. From the analysis the effect of yield per morgen on cost per bag is quite clear, but owing to the small sample no final conclusion on the relationship can be drawn⁽¹⁷⁾.

In Table 12 the relationship is shown between yield per cow and cost per gallon milk on fresh-milk farms in the vicinity of the Witwatersrand⁽¹¹⁾.

The cost per gallon milk decreases as the yield per cow increases. It would seem that under the price-cost relationship which existed

TABLE 12.—*Relationship between yield per cow and cost per gallon milk, Witwatersrand.*

GALLONS PER COW.		Number of cases.	Net cost per gallon. (pence.)
Group.	Average.		
400 and less.....	314	12	18.46
401 to 500.....	463	21	12.90
More than 500.....	601	16	12.73

during the year of the study (1939-40) and under the farm practices applied on the farms at the time, a further decline in cost per gallon was not obtained if the yield per cow was forced above 600 gallons per year. The high cost figure in the case of the lowest producing herds speaks for itself.

The inherent quality of the cow and the feed practices applied are certainly the two most important factors affecting milk yield per cow. Generally speaking, the milk yield per cow is exceptionally low in South Africa. In 22 maize districts of the country 229,760 cows milked⁽⁵⁾ gave during the year 1936-37 an average production of only 108.2 gallons milk per cow⁽⁶⁾. This amounts to three-tenths of a gallon milk per cow per day. The above-mentioned cows include cows which are kept under intensive conditions, as well as cows which are milked off the veld. In the case of intensive fresh-milk production for the city markets a high yield per cow is a very important economic necessity. It seems that in the United States of America a minimum yield of 6,000 lb. (600 gallons) milk per cow per annum is necessary to give a reasonable remuneration to the farmer⁽²¹⁾. In a study of fresh-milk farming in the vicinity of the Witwatersrand and in the more distant outer area the following results in connection with yields were obtained: in the case of the former, 50 out of 73 herds (or 69 per cent.), and in the case of the latter, 29 out of 39 herds (or 74 per cent.) yielded less than $1\frac{1}{2}$ gallons of milk per cow per day⁽²²⁾. The productivity of our dairy herds leaves much to be desired, and its low level is probably the most important factor in our high production costs of dairy products.

Before the discussion is closed on the relationship between yield per unit and cost of production in the case of South African agricultural products, it is necessary to give one example of the type of curve representing such relationship. Maize will be taken as example as it is the most important food product produced in South Africa. The Springbok Flats area is taken as a typical example, as shown in Figure 1⁽²⁾.

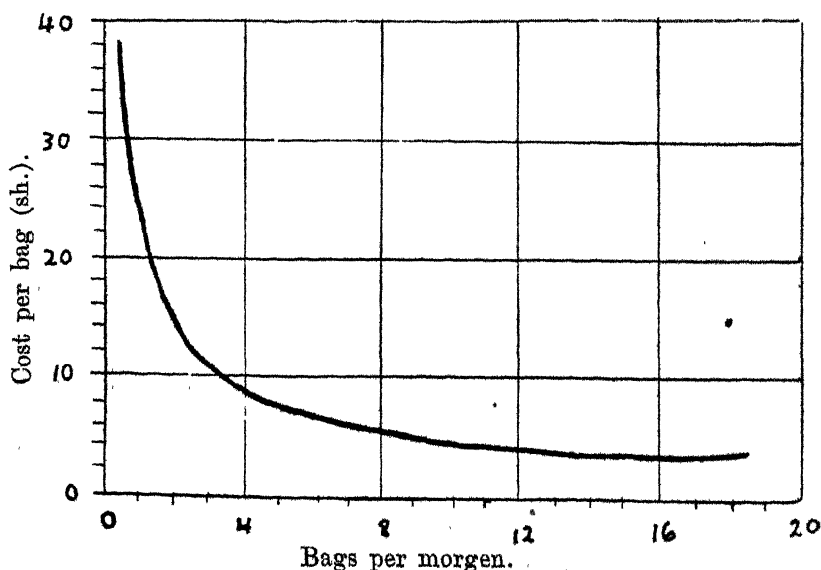


Figure 1.—Relationship between yield per morgen maize and cost of production per bag, Springbok Flats.

Similar figures can be referred to: maize⁽⁹⁾, wheat⁽¹⁸⁾ and peanuts⁽²⁾. In studying Figure 1 and the other figures referred to, it is important to note that the curve declines rapidly with the first few increases in yield per morgen and afterwards becomes practically horizontal. From the national as well as the individual farmer's point of view, it is essential that attention should first be given to those farms (naturally within the boundaries of the physical areas where the particular product should be produced) which, for various reasons, obtain very low yields per unit.

The same type of curve is found in connection with the efficient use of animal and mechanical draught power, in which cases similar reasoning can be applied. Compare, e.g., oxen draught power⁽²⁾, mule draught power⁽¹⁹⁾, and mechanical draught power⁽¹⁹⁾.

Unfortunately no information is available on the number of producers in the whole country who have low yields per unit of each important agricultural product. The Office of Census and Statistics is the only one having the facilities for computing frequency distributions of farms according to yield per unit. The samples included in our various farm economic studies represent a very small percentage of all farmers producing any specific product. Even so, each study shows that a large percentage of the sample obtain very low yields per unit. It can be accepted, therefore, that a very large percentage of our farmers produce at exceptionally high costs. A further increase in the high yields already obtained on some farms can be welcomed, but the most important problem is to increase the low yields per unit on a very large percentage of our farms.

To summarize the influence of yield per unit on cost of production at this stage, it can be stated that the former has a very important influence on the latter. All studies undertaken indicate a strong decline in costs per unit with an increase in yield per unit. This is especially true when very low yields are reasonably improved. Both the country and the individual farmer will benefit by increased yields per unit in agricultural production.

The Profit Aspect.

Although profit is not the only motive in agriculture, it does constitute the most important motive of the individual farmer in our modern economic society. It is therefore necessary to analyze briefly the profit aspect in connection with the problem under discussion.

The size factor and yield factor have, under conditions of a constant price, the opposite influence on profit per unit of product to that on cost per unit. In other words, if an increase in the above-mentioned two factors results in a decline in cost of production, it automatically brings about an increase in profit per unit of product.

As explained previously, an increase in the size of the farm has generally a favourable effect on the financial result (profit) of the farm as a whole. See, e.g., Tables 1, 2 and 3 of this article. It has also been indicated, however, that an increase in the size of the farm unit has a very small, if any, declining effect on cost per unit. Consequently it follows that under conditions of a constant price an increase in the size factor has no favourable effect on profit per unit of product⁽⁹⁾. See also, e.g., Tables 5, 6, 7 and 8 of this article.

Table 13 shows the influence of yield per morgen maize on profit per unit⁽²⁾.

In the case of maize production on the Springbok Flats an increase in yield per morgen results in an improved profit per unit. Also compare like results in the case of the following: wheat⁽⁷⁾ and ^a, maize⁽³⁾, peanuts⁽²⁾, citrus⁽¹⁰⁾, tobacco⁽¹⁵⁾ and ^b. The relation-

TABLE 13.—*Relationship between yield per morgen maize and profit per unit, Springbok Flats.*

YIELD PER MORGEN (BAGS).		Number of farms.	PROFIT PER UNIT.	
Group.	Average.		Per morgen. (£).	Per bag. (sh.).
2.5 and less.....	1.4	19	—0.42	—5.84
2.6 to 5.0.....	3.9	23	0.30	1.52
5.1 to 7.5.....	6.5	19	1.93	5.90
7.6 to 10.0.....	8.9	10	2.76	6.20
More than 10.0.....	12.2	15	4.31	7.04

ship between yield per morgen and both profit per morgen and per bag is not shown as such in all the cases referred to above. Whether the relationship is shown for either profit per morgen or profit per bag, it will be seen that the yield-profit factors are closely related.

The graphic illustration of the effect of yield on profit per unit (e.g., profit per bag) is practically the opposite to the relationship shown in Figure 1. See, e.g., the graphic illustration of the yield-profit relationship in the case of peanuts and maize⁽²⁾. The profit per bag increases very rapidly with the first few increases in yield per morgen, but later becomes practically horizontal. The yield-profit curve is practically similar to curves obtained in connection with fertilizer-yield experiments.

Although the matter is not directly connected with the chief problem under discussion, it is necessary to state something about the importance of quality production in connection with the profit aspect. There are various factors determining the price of any product, but within the same season and in the case of our controlled products price differences from farm to farm are to a large extent a reflection of difference in quality. It is very obvious that price has either a beneficial or detrimental effect on profit. A few examples to illustrate this will be given.

It seems that in all studies in which the effect of price on profit was analyzed, price per unit is positively related to yield per unit. The net influence of price on profit can therefore not be illustrated by means of the available examples. See, e.g., peanuts⁽²⁾, maize⁽²⁾, tobacco in western Transvaal⁽¹³⁾, and tobacco in western Cape Province⁽¹⁴⁾. Although the relationship between the causal factors in the case of citrus was not analyzed clearly, both yield per morgen and price per box have a favourable effect on profit⁽¹⁵⁾.

TABLE 14.—*Relationship between price per bag peanuts and profit per unit, Springbok Flats.*

PRICE PER BAG (SHILLINGS).		Number of farms.	Bags per morgen.	PROFIT PER UNIT.	
Group.	Average.			Per morgen. (£).	Per bag. (sh.).
7.0 and less.....	6.28	10	9.4	0.12	0.26
7.01 to 8.0.....	7.56	11	9.2	0.86	1.84
8.01 to 9.0.....	8.56	34	10.3	1.85	3.60
9.01 to 10.0.....	9.42	26	13.7	3.61	5.28
More than 10.0.....	11.34	19	12.9	4.20	6.46

The relationship between price and profit in the case of peanut production is shown in Table 14⁽²⁾. See also Table 13 and Appendix Table 2 of the same study.

The data in Table 14 show very clearly the effect of quality (price) on profit. The fact should not be lost sight of, however, that the increase in profit is partly caused by the yield factor.

In the effort to improve his financial result the farmer should therefore give serious consideration to quality production.

Size and Productivity Factors: A Comparison.

Thus far we have seen that (a) very little or no decrease in cost of production is obtained under constant yields per unit with an increase in the size factor; (b) the size factor has, under constant yields per morgen, a favourable effect on the financial result of the farm as a whole and, therefore, on any separate enterprise; (c) the productivity factor (yield per unit) brings about a decrease in cost of production and an increase in profit per unit of product; (d) the productivity factor brings about an improvement in the financial result of the farm as a whole and of any separate enterprise; and (e) quality (price) is an important factor in profitability. The last-mentioned factor (e) will not be discussed further but it is necessary to compare further the size and productivity factors. In the comparison which follows, both factors will be included in the same table.

Table 15 shows the effect of both the size factor (area under crops) and the productivity factor (crop index) on the financial result (operator's earnings) in the case of the Springbok Flats area⁽²⁾.

TABLE 15.—*Influence of area under crops and crop index on operator's earnings, average per farm, Springbok Flats.*

Groups.	Morgen crops.	* Crop index.	Number of farms.	Operator's earnings. (£)
150 morgen crops and less—				
crop index 100 and less.....	119	67	17	—15
crop index over 100.....	123	144	17	201
151 to 250 morgen crops—				
crop index 100 and less.....	211	63	14	—11
crop index over 100.....	203	154	22	382
251 to 350 morgen crops—				
crop index 100 and less.....	297	66	12	23
crop index over 100.....	295	145	14	682
More than 350 morgen crops—				
crop index 100 and less.....	468	63	16	137
crop index over 100.....	435	168	14	1,130

* Crop index is a measure of the average yields of all crops on the farm. The average of all farms in the whole sample equals 100.

In Table 15 above, (a) the farms are grouped into four main groups according to total area under crops; and (b) each size-group is sub-divided according to crop index (productivity) below average (i.e., low yields) and above average (i.e., high yields).

Various important conclusions can be drawn from the table, namely, that (a) within each size-group the financial result (operator's earnings) is higher with each sub-group having a high crop index than with the corresponding sub-group having a low crop index; (b) the influence of the size factor on operator's earnings is much more pronounced in the case of the sub-groups with a high crop index than in the case of the sub-groups with a low crop index (com-

pare, e.g., the increase in operator's earnings from £201 to £1,130 with the increase from -£15 to £137); and (c) the group of farms with the smallest area under crops but with a high crop index shows a better financial result (operator's earnings £201) than the group of largest farms with a low crop index (operator's earnings £137).

The results in Table 15 clearly indicate that in this particular case intensification on a small though economical farm unit gives the farmer better financial results than a large-scale farm with a low level of intensity. Not only the individual farmer but also the country benefits thereby in so far as a more productive use is made of the land in the former than in the latter case. *Increasing the size of the farm is justified only under conditions of a reasonably high productivity.*

The results obtained in Table 15 are no exception. Similar results were obtained in connection with wheat farming in the western Cape Province, in which case the area under wheat (by far the most important product) was taken as the size factor. The financial result on the group of farms with the smallest area under wheat, but with high yields, was far better than on the group of farms with the largest area under wheat, but with low yields⁽⁷⁾ and ⁽⁸⁾.

Analyses made with peanuts and maize as size factors show similar results with varying yields per morgen⁽²⁾.

It is also important to show the effect of the size and productivity factors on profit of a separate enterprise in a type of mixed farming. In Table 16 wheat farming in the winter-rainfall area is taken as an example. The original table is considerably shortened⁽¹⁸⁾.

TABLE 16.—*Influence of area under wheat and yield per morgen on profit of the wheat enterprise, winter-rainfall area.**

Yield per morgen.	Items.	AREA UNDER WHEAT (MORGEN).			
		100 and less.	101 to 150.	151 to 200.	More than 200.
6 bags and less...	Number of farms...	43	28	18	19
	Morgen of wheat....	67	133	171	273
	Bags per morgen...	4.3	4.5	4.6	4.6
	Profit on wheat (£).	-121	-105	-167	-116
More than 9 bags..	Number of farms...	14	20	18	17
	Morgen of wheat....	68	130	176	287
	Bags per morgen...	10.5	11.3	10.5	10.8
	Profit on wheat (£).	77	132	313	790

* The corresponding figures for the yield groups from 6.1 to 9 bags per morgen are deleted.

In the case of wheat farming a loss is experienced on the wheat enterprise in all size groups with yields of 6 bags and less. On the other hand, all size groups with a yield of over 9 bags per morgen made a profit on wheat. The effect of the size factor under conditions of high yields on profit is very clear. The most important fact in the above analysis is that the group of farms with the smallest area under wheat (average 68 morgen) but with high yields (average 10.5 bags per morgen) made a reasonable profit on the wheat enterprise (£77), as compared with the group of farms with the largest area under wheat (average 273 morgen) but with low yields (average 4.6 bags per morgen) where a big loss is suffered (-£116).

It is also clear in this case that there is no economic justification for expansion under conditions of low productivity.

economic studies of dairy farming have unfortunately not extended to such an extent that the above principle can be illustrated by more or less similar trends as shown in Tables 15 and 16 are the economic studies of dairy farming in the United States of America).

The samples quoted above to show the effect of the size and other factors on the financial result of the farm as a whole, as a specific enterprise, only illustrate certain economic principles of agricultural production. From the figures quoted it cannot be ascertained with any degree of certainty what minimum size of farm is necessary under the existing yield conditions to give certain profits, even in the best of circumstances, to the farmer. For such a deduction more intensive studies of the various homogeneous agricultural areas are required, and the results so influenced by price with the result that prices received for the products and prices paid for production goods should also be considered. In addition to this, the minimum income required to assure a certain standard of living should be determined. The term "minimum standard of living" should, of course, also be defined.

Summary and Conclusions.

One of the results of this analysis is the existence in South Africa of a very marked trend for agricultural products, especially food products, towards further expansion in mining, industry and trade, the result of which will show an increasing long-term trend, naturally with variations around that trend.

The agricultural industry will to a large extent have to react to this trend in demand, especially to satisfy the increased requirements. Should the increase in production occur in our marginal and sub-marginal areas for the various products, then it cannot be expected to be obtained at low yields and, therefore, at a low cost per unit. If it is accepted that the increased production must take place within the proper homogeneous areas for each product, no problems arise, namely, whether the increased production can be obtained through further increase in size of the present units or through higher productivity.

The percentage of our farms are uneconomic units on which the results of the factors of production cannot be made. This is a problem which was not analyzed any further. The analysis is confined to the economic aspect of production on varying sizes of farms and varying yields per unit.

Generally speaking, the size of the farm unit has a favourable effect on the financial result. This is due especially to a larger and more efficient use of the production goods. It is, however, necessary to obtain a larger turn-over only by means of a larger number of animal units; it can be obtained through higher yields, i.e., higher yields per morgen, per tree or per animal unit, or by both means.

In practice there is in general no relationship between size and productivity. Consequently, larger farms do not necessarily produce at a lower cost per unit than small farms.

Productivity, i.e., yield per unit, is the most important factor influencing the cost of production per unit of product. It is found throughout that an increase in yield per unit brings about a decline in cost per unit. Theoretically there exists a maximum above which further intensification is not economical, but there is still great room for further intensification in South African agriculture.

Rainfall is one of the most important factors affecting the total national production, but it is found that under similar rainfall conditions within the same season and in a homogeneous agricultural

area large differences in yields per unit occur. There are, therefore, apart from rainfall, other factors which affect yields and which are to a large extent within the control of the farmer himself.

The size factor and productivity factor have the opposite effect on profit per unit of product as compared with the effect on cost of production per unit. In other words, the profit per unit of product is closely related to the productivity factor. From the profit point of view quality is also a very important factor. Within the same season and for controlled products price reflects quality. It seems that in the case of several products high quality is accompanied by high yields. In the case of several products it seems, therefore, that the productivity factor has a still greater effect on profit than on cost of production per unit.

From the national as well as from the farmer's point of view, there is no justification for the enlargement of a farm under conditions of low productivity. Enlargement of a farm is economically justified only under conditions of high productivity.

Small farms or small enterprises in a farm business under conditions of high productivity give a larger total profit to the farmer than large farms or large enterprises under conditions of low productivity.

Exactly what can be determined within limits to be a minimum economic unit in every farming area of the country is a special problem in which various physical and economic factors are involved. No final conclusions regarding this problem can be made on the basis of this analysis.

From the social-economic aspect a large number of independent farm families on economic farm units with high productivity are a greater asset to a country than a smaller number of farm families of which many are on large but unproductive production units. The large farm producing under conditions of high productivity is, however, a great economic asset, and it should in no way be inferred from the present discussion that large farms should not exist.

From the view-point of greater agricultural production all the available economic data indicate that farmers should pay more attention to higher productivity than to expansion under the present low productivity level. Not only the individual farmer, whether farming on a small or large scale, but the country as a whole will derive very great economic benefit from the adoption of such a policy.

* REFERENCES.

- (1) Averages calculated on the basis of crop estimates for the two seasons separately, obtained from Division of Economics and Markets, Department of Agriculture, Pretoria.
- (2) TOMLINSON, F. R.—The Economics of Peanut and Maize Production on the Springbok Flats. Bul. 196, Department of Agriculture and Forestry, Pretoria, 1939. (Tables 39, 49, 50, 51, 66, 67, 71, 72, 73, 75, 76, 80, 81, Appendix Tables 1 and 2, figures 13, 14, 15 and 19.)
- (3) NÄBERLING, J. C.—An Economic Investigation of Farms in the Maize Districts of the Orange Free State. Bul. 81, Department of Agriculture, Pretoria, 1930. (Tables 20 and 23.)
- (4) TOMLINSON, F. R.—Profitability of Irrigation Farming in the Western Transvaal. Bul. 201, Department of Agriculture and Forestry, Pretoria, 1939. (Tables 11 and 17.)
- (5) Report on Agricultural and Pastoral Production, 1936-37. Agricultural Census No. 17, U.G. No. 18, 1939. (Table 17.)

GREATER AGRICULTURAL PRODUCTION.

- (6) TOMLINSON, F. R.—The use of the Agricultural Census in connection with Farm Organization Studies—a critical analysis with special reference to Maize Farming.—unpublished manuscript, University of Pretoria. In Afrikaans only. (Tables 1, 6, 10, 18.)
- (7) BESTBIER, N. A. B.—An Economic Analysis of Wheat Farming in the Swartland area of Western Cape. M.Sc.(Agric.) thesis, University of Pretoria, 1945. In Afrikaans only. (Tables 34, 35, 38, 39.)
- (8) PRETORIUS, W. J.—An Economic Study of the Wheat Industry in the Union. Bul. 141, Department of Agriculture and Forestry, Pretoria, 1935. (Tables 48 and 50.)
- (9) DE SWARDT, S. J., AND NEETHLING, J. C.—Report on an Economic Investigation into Farming in four Maize Districts of the Orange Free State. Bul. 173, Department of Agriculture and Forestry, Pretoria, 1937. (Tables 37, 40 and figure 2.)
- (10) PRINSLOO, A. L.—An Economic Survey of Citrus Growing in the Union. Bul. 221, Department of Agriculture and Forestry, Pretoria, 1941. (Tables 21, 25 and page 34.)
- (11) BEHRMANN, H. I.—An Economic Analysis of Fifty Fresh-Milk Farms in a special area of the Witwatersrand. M.Sc.(Agric.) thesis, University of Pretoria, 1942. (Tables 44 and 45.)
- (12) PARISH, E.—Report on the Cost of Production of Maize. Investigation for the season 1921–22. Sc. Bul. 33, Department of Agriculture, Pretoria, 1924. Also Sc. Bul. 38 for the season 1922–23.
- (13) PARISH, E.—Economics of Maize Growing in South Africa. Journal of the Department of Agriculture, Pretoria, March, 1924.
- (14) TOMLINSON, F. R.—A Business Study of Farming in the Limburg Area, Northern Transvaal. Bul. 197, Department of Agriculture and Forestry, Pretoria, 1938. (Table 25.)
- (15) PRETORIUS, W. J.—An Economic Investigation into the Tobacco Industry of the Western Transvaal, 1927–28. Bul. 89, Department of Agriculture, Pretoria, 1930. (Table 37 and page 70.)
- (16) VAN WYK, S. P., AND DU PLESSIS, A. J.—An Economic Investigation of the Turkish Tobacco Industry in the Western Cape Province, 1929–30. Sc. Bul. 107, Department of Agriculture, Pretoria, 1932. (Tables 43 and 47.)
- (17) TOMLINSON, F. R.—Production Costs of Soybeans in 1939–40. *Farming in South Africa*, February, 1941. (Table 5.)
- (18) NEETHLING, J. C.—A comparative Study of Wheat Farming in Four Sub-areas in the Winter-rainfall Crop Districts of the Union of South Africa. Bul. 227, Department of Agriculture and Forestry, Pretoria, 1941. (Tables 10, 31, and figure 1.)
- (19) TOMLINSON, F. R.—Mechanical and Animal Draught Power on Grain Farms. Bul. 152, Department of Agriculture and Forestry, Pretoria, 1935. (Figures 2 and 5.)
- (20) NEETHLING, J. C.—Economic Studies of Dairy Farming in New York, No. 9. Bul. 483, Cornell University Agricultural Experiment Station, Ithaca, N.Y., 1929. (Table 35.)
- (21) CUNNINGHAM, L. C.—Dairy Farm Management. Extension Bulletin 450, Cornell University Agricultural Experiment Station, Ithaca, N.Y., 1940. (Table 14.)
- (22) TOMLINSON, F. R., AND HAYEMANN, A. R.—The Production of Fresh Milk for the Witwatersrand, 1939–40. *Farming in South Africa*, October, 1941. (Table 10.)

* All data presented or referred to in this article are only meant to illustrate certain economic principles in agricultural production and to throw light on which course to follow. The various studies quoted were made during different periods in the past with the result that the actual costs or other figures do not necessarily have a bearing on present conditions. Within limits, however, the various principles illustrated remain constant.

The Production of Seed Potatoes :—

[Continued from page 74.]

fully as eggs. Continual care should be taken to prevent bruising, which will affect their keeping qualities.

Through the Departmental certification service for seed-potato growers' associations, substantial evidence has already been furnished that there are areas in this country which can produce seed potatoes equal to those produced in other parts of the world. If these associations and all their members adhere strictly to the instructions of the Department and sell only the very best seed potatoes, they will not only be safeguarding their own future, but will also be serving the industry as a whole.

A Successful Farm Demonstration.

E. Adler, Extension Officer, Middelburg, Transvaal.

ON the farm Rooikraal, in the Groblersdal district, belonging to Mr. H. Vermaak, an experiment was initiated to determine what effect the ploughing in of Sunn hemp would have on a subsequent wheat crop.

The soil is chocolate-coloured turf, which is partially derived from norite. Rooikraal lies considerably lower than Middelburg (Transvaal) but higher than Groblersdal, and the climate is slightly warmer than that of Pretoria. The most generally cultivated crops are tobacco during summer and wheat during winter, both under irrigation.

In the summer of 1944-45, two morgen of land were ploughed, tilled with a disc-harrow and then harrowed after the wheat crop had been harvested. The two morgen were divided into 10 plots of 10 by 200 yards each. Plots Nos. 1, 3, 5, 7 and 9 were sown with Sunn hemp seed at a rate of 60 lb. per morgen. Plots Nos. 2, 4, 6, 8 and 10 were left as they were, and weeds were allowed to grow on them. All the plots received exactly the same treatment and when the Sunn hemp was sown in November 1944 all the plots were harrowed.

The plots were not irrigated once during the summer. On 15 March 1945 when all the plots were ploughed with a disc-plough, the Sunn hemp was about 4 ft. high with a crop of fully developed pods. The weeds were only about 18 inches high. The summer was particularly dry and the Sunn hemp did not grow luxuriantly.

On 17 April 1945 the whole land (2 morgen) was sown to Tarkasariwari wheat (203 lb. of seed) after which it was disc-harrowed and then harrowed.

During the winter, the plots were irrigated three times, viz., on 18 April, 25 July and 20 August 1945. Special measures were taken to ensure that each of the plots received the same amount of water. The wheat was reaped by hand on 30 September and 1 October and the wheat from each plot stacked and threshed separately.

Results.

From the outset it was clear that the wheat on the Sunn hemp plots grew more luxuriantly and was of a darker green colour. At harvesting time, the wheat on the Sunn hemp plots was almost 12 inches taller than that on the untreated plots and the stools were larger and stronger.

If the yields of the various plots are carefully studied it will be clear that the ploughing in of Sunn hemp is highly profitable.

TREATED PLOTS.		UNTREATED PLOTS.	
Plot No.	Wheat yield (lb.)	Plot No.	Wheat yield (lb.)
1	1,015	2	925
3	1,085	4	845
5	1,030	6	820
7	1,155	8	820
9	1,128	10	586
TOTAL.....	5,413	TOTAL.....	3,996

Peach Mildew.

A. J. Louw, Western Province Fruit Research Station,
Stellenbosch.

PEACH mildew occurred for the first time in an epidemic degree in the western Cape Province during the 1941-42 season. Since that year there has been a steady increase in the intensity and spread of the disease so that it is now of general occurrence in all districts of the winter-rainfall area.



Fig. 1.—The powdery mildew disease of the peach as it appears on the young shoots (A), and the fruit (B).

Damage Caused by Peach Mildew.

Peach mildew is caused by a fungus (*Oidium leucoconium*) which occurs as a whitish, powdery growth on the surface of shoots, leaves and fruit. The whitish powder constitutes the spore masses of the fungus. Each one of these spores can again cause infection if it alights on a healthy part of the plant under favourable conditions.

The disease causes the drying out and shedding of the leaves, a die-back of twigs, and hard, white patches on the fruit, which in severe cases may result in the cracking of the fruit. Even slight infections are undesirable in dessert varieties on account of the defective appearance of affected fruit. For canning purposes some degree of infection is tolerated, but canneries have, in certain cases, refused to accept infected fruit. The mildew spots make peeling of the fruit very difficult and it may be expected that, with an increase in the supply relative to demand, canners will, in the near future, discriminate even more against such fruit.

Varietal Susceptibility.

Not one of the commercial peach varieties appears to be immune to mildew. The varieties Tuscan Cling, Kakamas and the so-called "Vark" peach (sometimes used as rootstock) are particularly susceptible to the disease. All nectarines and the white-fleshed peach varieties, Pucelle d'Malines, Duke of York, and Inkoos, are severely attacked, while the Peregrine and Early Dawn varieties are somewhat less susceptible. Of all the peach varieties under observation the Elberta appears to be the least subject to the disease. Apart from a few cases of severe infection of apricots, the disease has not been noticed on any of the other stone fruits.

Epidemic Development of the Disease.

The first infections of the season occur mainly on the fruit. The inoculum for these primary infections originate on the diseased dormant twigs and buds of the previous season. Leaf and shoot infections occur much later. These must presumably be attributed to an unfavourable relative humidity at the surface of these plant parts early in the season as compared with that prevailing on the hairy surface of the fruit.

Conditions of high humidity, with contemporary high temperatures, favour the development of mildew, while the presence of free moisture, as during a rain or foggy weather, has a retarding effect on the progress of the disease, in contrast to most other fungus diseases. Warm, sultry weather conditions, such as when a thunder storm is threatening, are exceptionally favourable to the development of mildew.

As a rule, therefore, mildew does not occur during early spring, but appears only towards the end of October and is at its worst during December and January. For this reason mildew is more severe in the warm interior regions such as Ceres, Montagu, Ladismith, Laingsburg and Clanwilliam than in the coastal areas such as Elgin, Somerset West and Stellenbosch. Orchards under irrigation are more subject to mildew attacks on account of the favourable conditions of temperature and humidity that exist in such orchards during the warm summer nights after an irrigation, when the air among the trees is saturated with water vapour. For the same reason orchards on poorly drained soils are usually more severely attacked by the disease.

PEACH MILDEW.

Control Measures.

The investigations in connection with the control of peach mildew have not yet succeeded in the development of entirely effective spray measures. So many enquiries have, however, been received from growers that a preliminary spray programme has been drawn up, based on the results of orchard and laboratory experiments carried out since 1943.

During the 1943/44 season a spray trial was carried out on Elberta peaches in the Koue Bokkeveld, Ceres. In this test a winter spray was applied when the buds were bursting, but before any green plant parts were exposed, that is, at the stage when peach trees are usually sprayed for leaf curl. The winter treatment was supplemented by various summer sprayings of which the first was given on 3 November, when the first mildew infections appeared on the new growth, and the second and third at intervals of two and four weeks, respectively. The different spray mixtures that were used, and the results of the spray test, are given in Tables I and II.

TABLE I.—*The effect of different summer spray treatments, following on a winter treatment with lime sulphur, on the incidence of mildew on the foliage and fruit of Elberta peaches during the 1943/44 season in the Koue Bokkeveld, Ceres:—*

Summer spray mixtures.	TWO SPRAYINGS.		THREE SPRAYINGS.	
	Percentage infected Leaves.	Percentage Infected Fruit.	Percentage Infected Leaves.	Percentage Infected Fruit.
Lime sulphur (0.5 per cent.).....	80	3	62	4
Lime sulphur (0.5 per cent.) + "Agral" (0.025 per cent.).....	93	2	81	3
Lime sulphur (0.5 per cent.) + Bentonite (0.5 per cent.).....	100	3	80	3
* Wettable sulphur (0.5 per cent.).....	100	3	56	3
Wettable sulphur (0.5 per cent.) + Bentonite (0.5 per cent.).....	93	4	51	3
Wettable sulphur (1.0 per cent.).....	100	9	59	9
Wettable sulphur (1.0 per cent.) + Bentonite (0.5 per cent.).....	76	3	52	3
* Colloidal sulphur (0.5 per cent.).....	96	8	46	11
Colloidal sulphur (0.5 per cent.) + Bentonite (0.5 per cent.).....	99	5	52	11
Colloidal sulphur (0.25 per cent.) + lime sulphur (0.5 per cent.).....	100	5	44	8
Colloidal sulphur (0.25 per cent.) + lime sulphur (0.25 per cent.).....	81	2	43	2
Colloidal sulphur (0.25 per cent.).....	96	6	61	4
No summer spray.....	Percentage infected leaves.		Percentage infected fruit.	
	100		4	

* The wettable and colloidal sulphurs used in this test were the proprietary products "Wetsul" and "Capoidal", respectively.

According to the data in Table I, the various sulphur-containing fungicides that were tested, did not show any great differences in their effectiveness against mildew. The best results were obtained with a mixture of colloidal sulphur and lime sulphur—a mixture

that, according to certain authors, gives better control of the mildew fungi than each of the component fungicides separately. Three summer applications of the two lime sulphur and colloidal sulphur combinations that were tested, reduced the average infection of the foliage to 43 and 44 per cent. respectively, as against 100 per cent. infection in the untreated plots.

These results are, however, not confirmed by the data in the series where only two summer sprayings had been given. In this series the best control of mildew on the leaves was given by a 1.0 per cent. mixture of wettable sulphur with an addition of bentonite, which reduced infection of the leaves to 76 per cent., while in the plots that were sprayed with the two combination sprays of lime sulphur and colloidal sulphur, the infection of the foliage averaged 81 and 100 per cent. On the fruit the best control was obtained with a mixture of colloidal sulphur and lime sulphur with a wetting agent ("Agral"). The data in this series were taken simultaneously with those in the series that received the three summer spray treatments and this fact may account for the divergence in the results, for the differences in control acquired by the various treatments, had mostly disappeared again during the period between the second application and the time when the final results were taken.

In general, the differences in control obtained by the various fungicides in this test were very insignificant. In another spray test (see Fig. 2), however, lime sulphur proved decidedly superior to the insoluble sulphur sprays. Furthermore, as lime sulphur is the most economical of the materials tested, it is provisionally recommended as the best wet spray to use against the mildew disease. This mixture at 39 per cent. polysulphide strength, when diluted to one gallon in 200 gallons water, proved to be entirely safe for use on peach trees in foliage. A light degree of scorching and shedding of leaves occurred on some occasions when very hot weather followed shortly on the lime sulphur application. This spray injury was, however, so slight that it could not be regarded as of economic importance. The addition of a wetting agent, "Agral", to the lime sulphur, in either the winter or the summer applications, in this test, had no effect on the disease, but showed a tendency to increase spray injury in the case of the summer applications.

TABLE II.—*The effect of different winter sprays, followed by summer treatments, on the incidence of mildew on the foliage and fruit of Elberta peach trees during the 1943-44 season in the Koue Bokkeveld, Ceres:—*

Winter treatment.	Summer Treatment.		Percentage infected leaves.	Percentage infected fruit.
	Spray material.	Number of sprayings.		
Lime sulphur + "Agral"....	Wettable sulphur..	2	94	5
Lime sulphur + "Agral"....	Wettable sulphur..	3	46	4
Lime sulphur.....	Wettable sulphur..	2	85	4
Unsprayed.....	Wettable sulphur..	3	61	16
Lime sulphur.....	Unsprayed.....	—	100	4
Unsprayed.....	Unsprayed.....	—	100	14

According to the data in Table II the winter spray had a very important effect on the control of the disease on the fruit. The application of only the winter spray with lime sulphur reduced infection of the fruit to 4 per cent. as against an average infection of 14 per cent. of the fruit on unsprayed control trees. Where the

PEACH MILDEW.

winter spray was omitted and only three summer sprayings with wettable sulphur were given, the infection of the fruit averaged 16 per cent. The winter spray had, however, no effect on the infection of the foliage, for in both the untreated plots and in those that received a winter treatment, 100 per cent. of the leaves were infected. This fact seems to indicate that, at the time the leaves become infected, the secondary infection sources are of supreme importance in the further progress of the disease and that the remnants of the fungus on the twigs and bud scales of the previous season subsequently play only an insignificant rôle. The poor control of the disease on the foliage must therefore be attributed to the abundance of secondary infection sources on the unsprayed control trees.

The results in Tables I and II indicate that on the leaves the disease was better controlled by three than by two summer sprayings. In the case of the fruit, however, there was not only no difference in favour of three summer sprayings, but all the summer treatments had very little effect on mildew infection. It would appear, therefore, that the fruit infections originate mainly from the primary infection sources and that the early treatments are indispensable for the protection of the fruit.

The rôle played by the secondary infections in the development of the disease on the foliage is well illustrated in Fig. 2, which gives a graphic presentation of the incidence of the disease on trees that received different summer spray treatments. In this experiment,

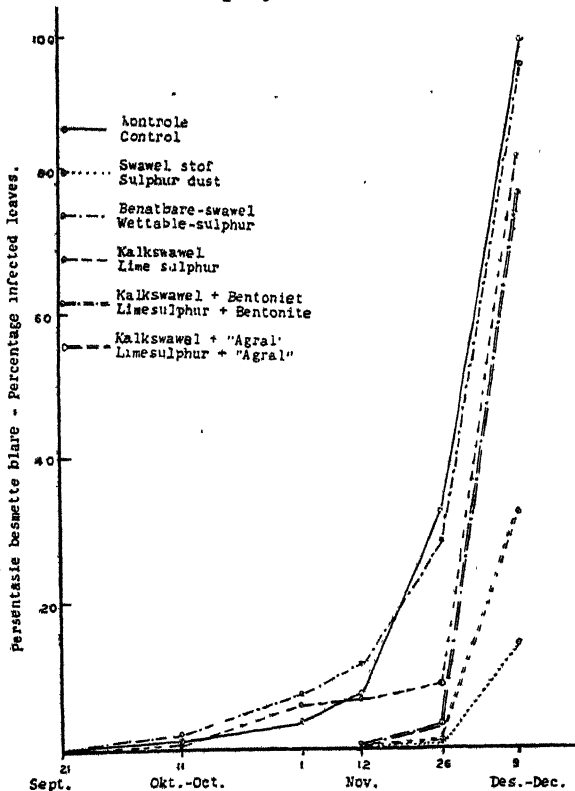


Fig. 2.—Graph showing the effect of different summer spray treatments following on a winter treatment with lime sulphur on the progressive development of mildew on the foliage of Inkoos peaches at Elgin during the 1943/1944 season.

in which 45 different combinations of spray materials were tested in a peach orchard at Elgin, individual trees were used as test units. Secondary spreading of the disease could therefore take place to a much greater extent than in the Ceres test, in which blocks of nine trees each were used as units. The curves in Fig. 2 show how the differences in degree of infection, brought about by the various treatments, were largely obliterated by large-scale secondary infections that occurred between 26 November and 9 December.

The predominant effect of the secondary infection sources on the incidence of the disease on the foliage and young growth must be attributed to the masses of spores produced by the fungus and the spreading capacity of these spores, which are readily carried away by air currents from diseased to healthy trees. Where orchards can be treated as a whole, much better results should therefore be obtained than those indicated by the results of these tests.

Recommendations.

As shown in Fig. 2 the summer treatment, consisting of dustings with sulphur, yielded the best results in the Elgin test. At present, however, sulphur dusting in commercial orchards would not be feasible, as there are practically no power dusting machines in use in the fruit-growing regions of the western Cape Province. Wherever the size of the orchards and trees permit, sulphur dusting treatments may be applied by means of the "bellows" or the "rotary" types of vineyard sulphurators with great success. For this purpose any sulphur may be used provided it contains at least 90 per cent. pure sulphur, is not lumpy, and is fine enough to dust well.

Based on the results obtained in the various experiments carried out up to the present, the following preliminary spray programme is proposed for the control of peach mildew:—

- (1) Spraying with lime sulphur (1 gallon to 14 gallons water) when the buds burst.
- (2) Spraying with lime sulphur (1 gallon to 200 gallons water) at petal-fall.
- (3) Spraying with lime sulphur (1 gallon to 200 gallons water), or a dusting with sulphur, when the first infections appear—usually about the middle of October.
- (4), (5) and (6) The same treatment as given under (3) applied after intervals of two to three weeks.

The spray trials have shown that the effectiveness of any spray programme against mildew is to a very large extent determined by the time and the thoroughness of the spray applications. In the above spray programme the first two applications are intended to reduce, as far as possible, and possibly eradicate the sources of the primary infections on the infected buds and twigs of the previous season. The first or dormant spray usually is in any case applied for leaf curl if copper-containing materials are not sprayed for this purpose. For the control of mildew it is, however, important that this application should be applied as near as possible to the time when the buds open. When the outer bud scales are beginning to separate, the spray material can penetrate better between the bud scales where the causal fungus overwinters.

When the second application is given, all the buds have opened and the causal fungus is therefore more exposed to destruction by the spray material. At this stage the young fruits and leaflets are

also exposed and, to avoid spray injury, the concentration of the spray mixture must be reduced to one gallon in 200 gallons of water. The eradivative effectiveness of the mixture is therefore very much reduced at this stage. For success in the control of the disease it is essential that each bud be thoroughly covered with the spray material. Such complete coverage by the spray material is, however, greatly hampered by the young leaves around the buds and can only be achieved when the spray jet is constantly under high pressure.

Mid-season and late summer treatments *alone*, if not preceded by the winter and early spring treatments, cannot be depended upon to control the disease. The young growing tips of the peach tree, which are so highly susceptible to the disease, are continually exposed to infection, because treatments cannot be repeated often enough to keep the new growth covered with the spray material. The most important effort towards control of the disease must therefore be made during the winter and early spring when the sources of infection can be reduced to a minimum. At the later stages thorough spraying is very difficult on account of the relatively large foliar surface of the peach tree. The long peach leaves are lax and inclined to pack together; consequently, they are pressed together in clusters by the force of the spray jet, and the fruit and lower leaf surfaces are very often not properly wetted by the spray material. At this stage much better coverage of the plant parts can be obtained by means of dusting. It is further very desirable that the later treatments should be applied, as far as possible, just before the trees are irrigated so as to give special protection to the foliage during the period of very favourable conditions for mildew-development, created by the irrigations.

Apart from spraying it is advisable to remove as far as possible all infected twigs during the winter pruning operations. This applies especially to orchards that had been heavily infected during the previous season. Furthermore, as conditions prevailing in poorly drained orchards favour the development of mildew, it is strongly recommended that the drainage of wet portions in orchards be improved without delay.

Where peach trees had been severely affected by the mildew disease, the control measures outlined above will not give entirely satisfactory results in the first year. The various sprayings recommended will cause less buds to become infected and in this way will limit the most tenacious overwintering form of the fungus. The most important effect of the above spray programme will, therefore, only be noticeable in the ensuing season. Generally, many infections will still occur during December and January after the termination of the spraying operations. By this time, however, sufficient shoot growth will have occurred that will be free from mildew to enable the reconstruction of a comparatively healthy framework for the tree by the removal of all the infected tips during the subsequent winter. Once trees have become badly affected, it is very difficult to rid them of the disease and it is only by reducing the overwintering source of the causal fungus year after year that ultimate recovery can be procured. This can be achieved by systematically following the recommended control measures for a number of years.

Newcastle Disease of Poultry.

J. D. W. A. Coles and A. M. Diesel, Onderstepoort.

NEWCASTLE DISEASE, also known as Ranikhet disease, Manila fowl disease, Chosen disease, and pseudo fowl plague, has for years been common in the Philippines, Java, Sumatra, Malay States, Korea, Japan, Siam, Burma, Ceylon and India.

It has broken out twice in England and twice in Australia, but prompt action led to its immediate eradication. Since the recent war began, the disease has swept through Italy, killing fowls in enormous numbers. In 1935 it appeared in California, causing heavy losses. Now it occurs in some eastern portions of the United States as well.

How long ago it spread to the east coast of Africa is not certain, but in 1935 it was found at Mombasa. Later it appeared in Nairobi and then in the Congo. Towards the end of 1944, Newcastle disease broke out in the vicinity of Durban and all the evidence pointed to its introduction by sea. So far nearly all the losses have been confined to fowls owned by Indians in the suburbs of Durban and at the sugar mills along the north and south coasts. So Africa, once free, is now extensively infected.

Species Susceptible.

The disease is primarily one of the fowl. Though birds of all ages are susceptible, the mortality in chickens is often low. In America, the turkey has been found to be susceptible to the natural disease, but in South Africa we have so far failed to transmit the infection, even artificially, to the species. The guinea-fowl readily acquires the disease. Pigeons very rarely contract the natural disease, but can easily be infected artificially.

Only with difficulty can ducks be infected and in Nature they remain healthy. Indeed, it has been a common sight in Natal to see ducks walking around Indian homes after all the fowls had succumbed. The position concerning wild birds is still very obscure, but they certainly failed to spread the disease in Australia and England. Mammals like rabbits, guinea-pigs, mice and sheep are not susceptible.

Cause.

The disease is caused by a virus and the size of the infective particle varies from 80 to 120 millionths of a millimetre in diameter. In a decomposing carcase, and in dirty ponds and soil, the virus is usually dead within 3 to 7 days. There is evidence, however, that the virus may sometimes survive in an empty fowl house for seven weeks.

Important, however, is the fact that the virus can live in a fowl carcase in a refrigerator for six months, so that it is easy to understand how such a carcase of an infected fowl, taken on board in Rangoon, for instance, can, when smuggled ashore at Durban, lead to an outbreak of the disease in its environs. Actually, the disease in Natal was probably introduced from some East African port.

Boiling kills the virus in a minute or two, and disinfectants also kill it easily.

The virus is most abundant in the mucus in the mouth and in the droppings, and birds become infected by consuming food and water contaminated by this mucus and the droppings. The virus is present also in the liver, spleen, brain, kidneys and other organs, but sometimes is absent from the blood.

Carriers of the virus, i.e., apparently healthy birds harbouring the virus and perhaps shedding it, are unknown.

Symptoms.

The incubation period is 2 to 5 days as a rule. The fowl gets mopy and the comb usually turns dark. Often there is diarrhoea, which may be yellowish-white or greenish-yellow. A high temperature is usually found only on one day, i.e., after symptoms develop. Ten per cent. or more of the cases reveal respiratory distress and stretch out their necks and breathe through the open mouth, and may gurgle and even squawk like birds with laryngeal roup. Not infrequently an affected bird walks and flops around like a drunken man, and these symptoms may persist even after recovery. An uncommon, but characteristic symptom, is dribbling of thick mucus from the mouth, which then soils the breast feathers.

Sometimes the face appears to be slightly swollen. A slight watery discharge from the nose may be seen. Death usually occurs in 1 to 4 or 5 days, and 90 per cent. of cases succumb on most farms. A recovered bird is solidly immune. No form of treatment or vaccination is known.

Post Mortem Appearances.

There is usually some dry secretion round the nostrils. Often the throat is inflamed; and yellowish, flaky deposits may be present on the membrane. Sometimes the larynx and upper end of the windpipe contain yellowish, cheesy plugs which lead to suffocation. The crop often contains evil-smelling fluid. The internal lining of the proventriculus (that part of the gut leading into the gizzard from the gullet) usually shows red spots. Small red spots may also be seen in the abdominal fat. Frequently there are a few, or even many, red spots on the internal lining of the small intestine. The lesions seen in the dead bird are thus not very typical in many cases.

Diseases Easily Confused with Newcastle Disease.

There are many such diseases and include *fowl plague*, *fowl cholera*, *spirochaetosis*, *fowl typhoid*, *visceral gout*, *roup* and *infectious laryngotracheitis*. Indeed, the diagnosis has been missed more than once, with disastrous consequences. Newcastle disease should be suspected if a rapidly fatal infection breaks out and if the fowls show difficulty in breathing, diarrhoea and nervous symptoms, such as twisting of the neck or inability to walk properly. Naturally, it is unusual for any one fowl to show all the possible symptoms.

What Should be Done if the Disease is Suspected.

Do *not* send live or dead birds for examination, but immediately communicate any suspicion of the disease to a Government Veterinary Officer, or Stock Inspector, or the Police.

How to Avoid Introducing the Disease on to a Farm.

Do not allow any poultry or domestic pigeons of any age on to the farm unless their origin is well known. Some outbreaks in Natal occurred within a week of the farmer buying fowls cheaply from itinerant Indians and natives. Try to buy food only from a firm selling it in new or properly sterilized sacks. Do not buy poultry manure for fertilizing the garden unless its origin is above suspicion. Spray all crates returning from market with 5 per cent. carbolic acid before they are taken anywhere near the poultry plant. Do not visit

other people's poultry and see that birds belonging to servants are kept at a safe distance. A number of farmers in Natal got the disease in their flocks by allowing contact between their fowls and those running round Indian barracks.

If a dead fowl is bought from a butcher, do not throw the uncooked entrails out to be carried about by a dog or cat or to be eaten by poultry.

The risk of getting the disease on to a farm will be greatly minimized if the fowls are always kept penned up. Allowing them to roam on free range often enables them to make contact with other infected stock. Moreover, when a flock has access to a large piece of land, and the disease breaks out, the infection spreads slowly from fowl to fowl, and such a farm consequently remains a source of danger to the rest of the community for even a month or more.

How the Disease can be Eradicated.

To hasten matters and prevent the infection escaping to other premises, it is advisable to slaughter all fowls, ducks, turkeys and pigeons. All *avians* should be killed, and not only fowls, in order to make doubly certain that no infection remains. Restocking may be considered in two months' time.

Control Measures.

According to the provisions of Government Notice No. 1328 of 25 July 1945, the following control is exercised:—

(a) *Infected Area*.—(At present, the Magisterial districts of Durban, Inanda, Lower Tugela, Pinetown, and Umzinto.)

- (i) Except under the authority of a written permit issued by a Government Veterinary Officer no person shall move or cause to be moved any poultry, poultry carcass or portion thereof, any poultry manure or feathers (except feathers contained in manufactured articles), *into, out of, or from any one place to any other place within the infected area.*

This prohibition shall not apply where dressed poultry is moved into, or from any one place to any other place within the infected area. (A dressed bird should have had the head, legs and feathers removed. It should also be drawn, but the heart, liver and cleaned gizzard may accompany the carcass.)

- (ii) Except under the authority of a written permit issued by a Government Veterinary Officer no person shall move, or cause to be moved *from the infected area*, any crates or boxes in which poultry have been kept.
- (iii) All owners or persons in charge of premises or property in any area within the *infected and prohibited area*, and upon which there have been or are poultry infected with Newcastle disease, shall immediately disinfect all poultry houses, crates, boxes, food and water containers, bags and other articles with which such infected poultry has been in contact.

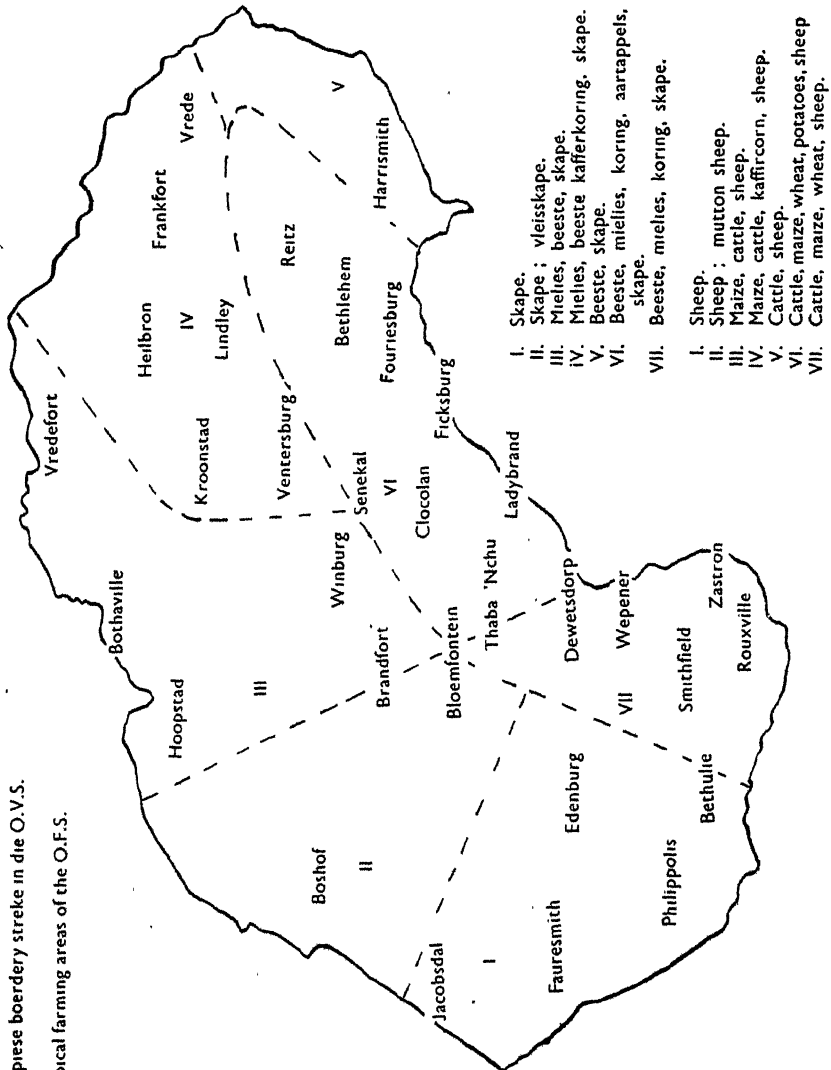
(b) *Prohibited Area*.—(At present, the Magisterial districts of Camperdown, Eshowe, Mapumulo, Mtunzini, Ndwedwe, Port Shepstone, Richmond and Umlazi.)

Except under the authority of a written permit issued by a Government Veterinary Officer no person shall move, or

Land Prices in the Orange Free State.

J. C. de Klerk, Sheep and Wool Officer, College of Agriculture,
Glen.

WARS always give rise to violent economic fluctuations, by which every individual in the country is affected in some way or other. The first world war was followed by a period of economic instability unparalleled in history. A brief fifteen years ago, the Union suffered one of the worst depressions it has ever known, and



Kaart aantonende die tipiese boerdery streke in die O.V.S.

Map showing the typical farming areas of the Q.F.S.

now we must face the aftermath of the second world war with its manifold disruptions, especially in the sphere of agriculture.

The agriculturist is called upon to adjust himself not only to the fluctuating prices of agricultural products, but also to fluctuating land prices. The purchase of land is a long-term investment, however, and miscalculations in this respect can result in more problems and have more far-reaching effects than in any other sphere of agriculture.

In order to determine to what extent the price of land has risen in the Orange Free State during the war years, the writer has made an analytical study of various farms with the aid of data obtained from the Deeds Office, Department of Lands, Bloemfontein.

This study covered 198 comparable farms, that is to say, properties which were in the market during the years 1936-39 and came in the market again during the war years of 1940-45.

The properties, aggregating 114,849 morgen, had a pre-war market value of £382,842, or an average price of £3.3 per morgen. These properties changed hands again during the years 1940-45 for a total sum of £605,045, or an average price of £5.3 per morgen, representing a rise of 63.3 per cent. for the whole province. It may be mentioned here for the sake of interest that the available figures for the first few months of 1944-45 indicate that prices of agricultural land for the whole Union are already 85 per cent. above the average for the basic years of 1936-39.

Land prices have naturally increased more in some districts than in others. The increase in the value of the same properties in each district, is reflected on a percentage basis in Graph 1, and it is especially noteworthy how prices soared in areas influenced by the gold fever.

Generally speaking, land prices would probably have advanced much further, under the influence of certain favourable factors, viz., (i) the increased prices of all agricultural products, (ii) ample credit which could be obtained on easy terms, (iii) the development of irrigation facilities as a result of the construction of the Kalkfontein Dam in the south-western Orange Free State, (iv) the discovery of gold in the northern districts and (v) the floating capital of city-dwellers who invested their money in land.

All these factors encouraged an increase in land prices, but fortunately there were also retarding factors which prevented any rapid and abnormal rise, namely, (i) the fixing of producer's prices, (ii) control measures taken by the State against speculation in land, (iii) the higher prices which farmers had to pay for requirements like agricultural implements, fertilizers, etc., (iv) lower yields per morgen as a result of the serious shortage of fertilizer, and (v) the fact that, during the war years, the Land Bank and the Farmers' Relief Board disposed of many properties to new owners at pre-war prices.

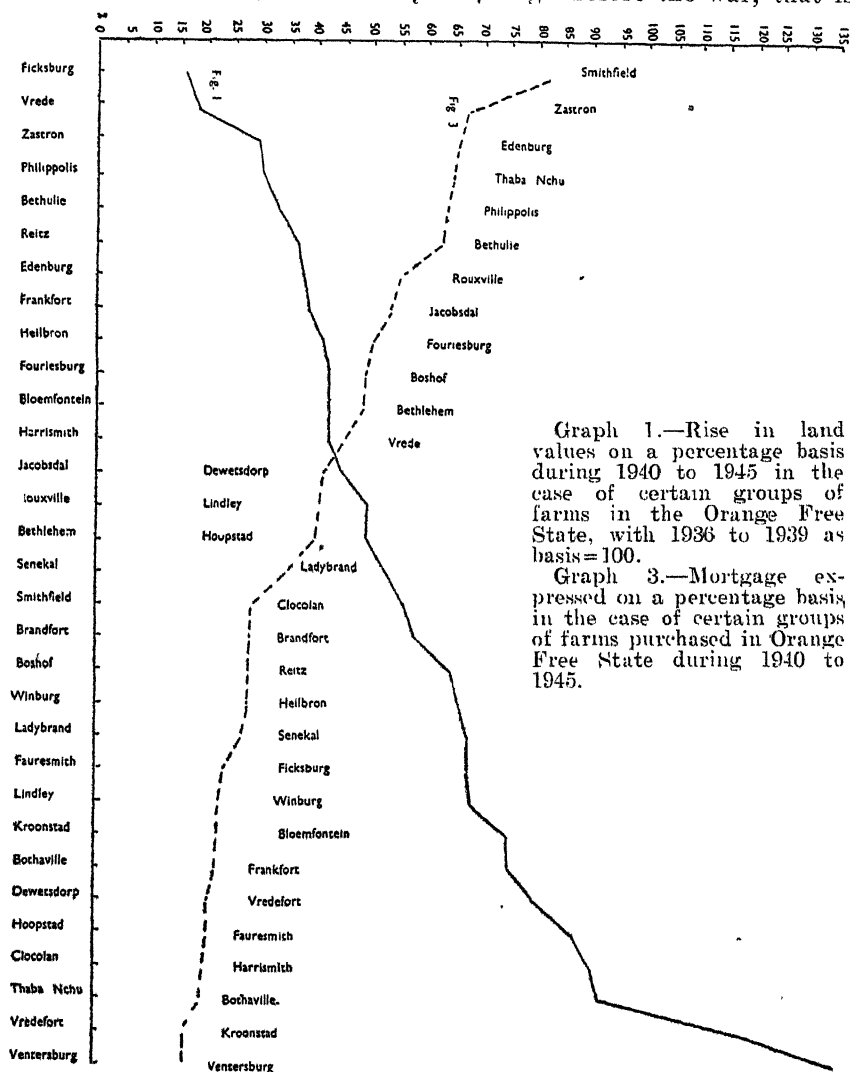
A few noteworthy points emerge from Graph 1, as is naturally to be expected, namely, that there was a very much greater increase in prices in *crop production areas*, where maize, wheat, potatoes, etc., are grown, than in areas devoted more exclusively to *animal husbandry*. In some of the latter districts especially, it is clear that the prices which were paid for land exceeded their agricultural value.

The other factor which induced the greater rise in prices in the northern districts was, of course, the discovery of gold, but a factor

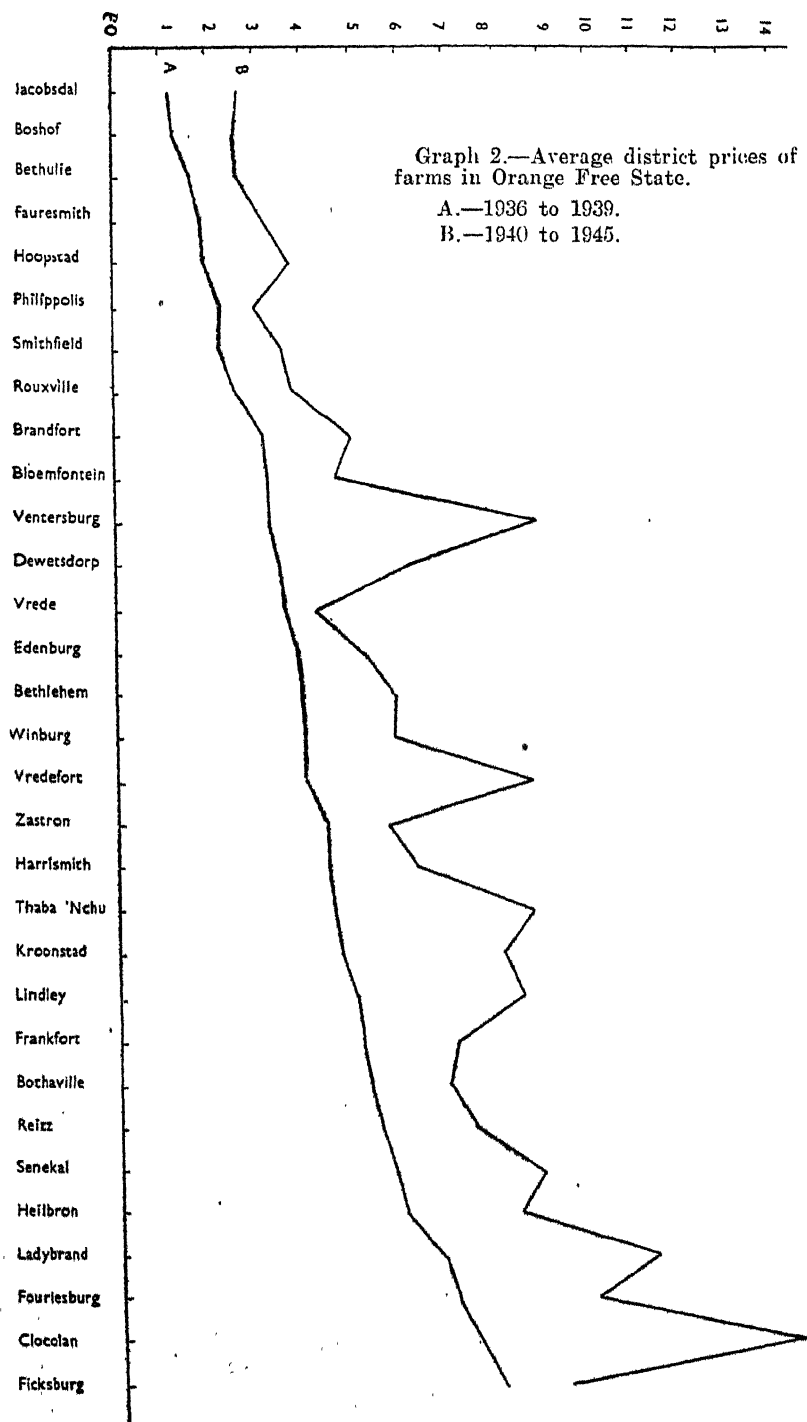
LAND PRICES IN THE ORANGE FREE STATE.

of no less importance is the growing realization that the north-western Orange Free State is a very regular producer of maize.

It is not quite clear, however, why the price of land should have increased so little in the Ficksburg district, but the explanation is probably to be found in Graph 2, indicating the average district land prices for the years 1936-39 and 1940-45, namely, that the price of land in Ficksburg was already very high before the war, that is



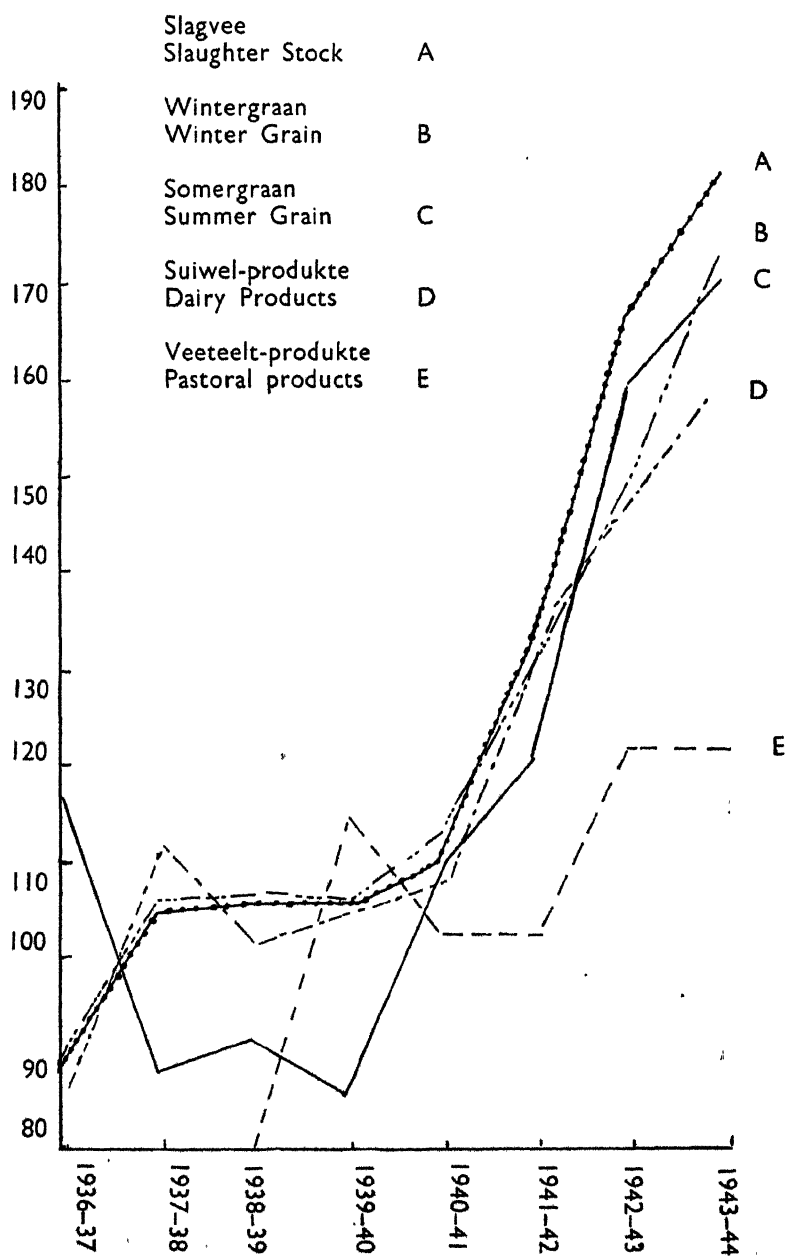
to say, £8.1 per morgen, which is also the highest in the Orange Free State. Even now land prices are very high in that area, and their average of £9.4 per morgen is exceeded only in the Clocolan and Ladybrand districts where the reason must be sought largely in the heavy demand and high prices paid for potatoes. As has already been indicated, land prices during the years 1936-39 were highest in the Ficksburg district and lowest in Jacobsdal and Boshof. At present, land prices are highest in Clocolan and Ladybrand and lowest in Bethulie.



Relation between Prices of Land and of Products.

Farmers must remember that debt incurred on agricultural land can be met only from income derived from that land and that, if the price of land is too high, the farmer is compelled to extract so

LAND PRICES IN THE ORANGE FREE STATE.



Grafiek 4.—Indekssyfers van verskillende groepe landbouprodukte, 1936-37 tot 1943-44 (1936-37 tot 1938-39 = 100).

Graph 4.—Index figures of various groups of Agricultural Products, 1936-37 to 1943-44 (1936-37 to 1938-39 = 100).

much more from his soil, with the result that if he experiences a setback, which occurs only too often with an erratic climate, he generally loses everything. Moreover, it should be borne in mind that the prices of products will not remain at their present high level indefinitely, and that, with few exceptions, the price of land is always the greatest single factor determining the cost of producing an agricultural product. If producers' prices decline when farmers must still derive the same income from a morgen of ground, it means that the soil must produce or carry so much more to compensate for the fall in prices. This compensation, in the form of increased yields, is an extremely unstable factor and in times of depression it is usually the owners who must wrest this increased yield from their soil, who fail and go under. Farmers should refrain from buying land *on credit* during an inflationary period when money is plentiful and cheap. Nevertheless, there is a ray of hope for the less well-to-do farmers who were compelled by circumstances to incur heavy debts in order to obtain land, in that, firstly, the intense demand for most agricultural products will continue for a long time after the war, and, secondly, the measures instituted by the State for the control of the prices of products will have a stabilizing effect.

In this connection it must be emphasized that this favourable view reflects more particularly the situation in regard to field crops, meat and dairy products. It does not hold true with equal force in the case of the wool producer. A glance at the price index of animal products and fields crops in Graph 4, will show that wool prices have risen very little in proportion to the prices of other agricultural products during the war years. In fact, wool prices have already gone down five per cent. since 1 July, 1945.

Mortgages.

There is a further reason why the increase in the price of land in certain sheep areas has been out of proportion to that of meat and wool. If the success of a farmer is to be judged by his ability to reduce his mortgage debt, it is important to know what percentage of the purchase price of the land he himself provided during the years 1940-45 and how much additional debt had to be incurred.

From an analysis of certain groups of farms over the whole province, it appeared that 224 farms, representing 163,180 morgen, were purchased for £749,488. Of this amount, the farmers themselves furnished £451,893, the balance of £297,595 being raised under mortgage. In other words, the aggregate mortgage debt represents only 40 per cent. of the purchase price. This appears to be a very favourable state of affairs, since it will greatly simplify the problem of adjustment in the future. Once again, however, this applies more to certain districts than to others. This is reflected in Graph 3, in which the mortgage debt on these groups of farms is indicated on a percentage basis and from which it appears that the burden of debt on properties in crop-producing areas and areas in which merino-sheep farming occupies a secondary place in the farming enterprise, is comparatively low. (Money obtained from options on land, probably played a considerable rôle in this respect.) What is of particular importance is the fact that the burden of debt is still not disproportionate to the rise in land prices. In short, although land prices have been greatly increased, the aggregate debt is small. On the other hand, the position is more unfavourable in the recognised sheep-farming areas, with the exception of the Harrismith, Faresmith and Dewetsdorp districts. The aggregate mortgage debt on a group of farms in this area amounted to as much as 82 per

LAND PRICES IN THE ORANGE FREE STATE.

cent., which is out of proportion to the increase in land prices. In other words, although the rise in land prices has not been very great, the burden of debt is very heavy, and in at least one district further analysis revealed that the debit figure is at present 5 per cent. higher than before the war. What lends an even more unfavourable aspect to the matter in this district is the fact that, although some of the mortgages were raised as long ago as 1936-37, the owners of the farms concerned have been unable to extinguish their debts or to reduce them appreciably, even during this period of prosperity.

Land Prices in Various Districts.

The following table indicates how land prices vary from one district to another, and how the prices of these same properties have risen during the war years:—

	1936/1939. Per morgen.	1940/1945. Per morgen.		1936/1939. Per morgen.	1940/1945. Per morgen.
<i>Frankfort.</i>	£ s. d.	£ s. d.	<i>Heilbron.</i>	£ s. d.	£ s. d.
Farm A.....	2 10 0	4 12 0	Farm A.....	3 10 0	4 10 0
Farm B.....	4 4 0	5 18 0	Farm B.....	4 19 0	5 10 0
Farm C.....	5 8 0	8 6 0	Farm C.....	5 2 0	10 0 0
Farm D.....	5 10 0	7 0 0	Farm D.....	7 10 0	11 16 0
Farm E.....	6 0 0	7 2 0	Farm E.....	10 0 0	15 0 0
Farm F.....	6 12 0	8 10 0			
<i>Nocolan.</i>			<i>Kroonstad.</i>		
Farm A.....	2 14 0	10 10 0	Farm A.....	2 18 0	5 8 0
Farm B.....	6 17 0	11 15 0	Farm B.....	4 0 0	8 0 0
Farm C.....	7 7 0	9 15 0	Farm C.....	4 18 0	9 14 0
Farm D.....	7 11 0	21 0 0	Farm D.....	5 0 0	8 0 0
Farm E.....	8 0 0	9 5 0	Farm E.....	5 10 0	9 2 0
Farm F.....	8 8 0	26 0 0			
Farm G.....	10 18 0	18 9 0			

Although the State appropriated one third of the profit on land bought after October, 1939, and resold subsequently, and two thirds of the profit on land bought and resold after 27 February 1942, some owners could not resist the temptation to make what little profit they could. A few of these cases are quoted here for the sake of interest:

Farm A, 1,583 morgen in extent
sold in 1939 for £8,815.
resold in 1943 for £11,000.
resold in 1944 for £14,468.

Farm B, 305 morgen in extent
sold in 1939 for £1,357.
resold in 1942 for £1,900.
resold in 1944 for £2,625.

Farm C, 756 morgen in extent
sold in 1939 for £2,268.
resold in 1944 for £3,402.
resold in 1945 for £4,400.

The writer is indebted to the staff of the Deeds Office, Bloemfontein, for their willing co-operation and permission to inspect the necessary documents.

REFERENCES.

- (1) DR. F. R. TOMLINSON, *Farming in S.A.*, April, 1945.
- (2) Index of Prices, *Farming in S.A.*, July, 1945.
- (3) PROF. C. V. H. DU PLESSIS, *Landbouweekblad* of 23 May, 1945.

Newcastle Disease of Poultry:—

[Continued from page 102.]

cause to be moved *from the prohibited area* any poultry, any poultry carcase or portion thereof, any poultry manure or feathers (except feathers contained in manufactured articles) or any poultry crates and boxes in which poultry are or have been kept.

The above prohibitions do not apply where poultry, poultry carcasses, etc., are dispatched direct to the Market Master, c/o Municipal Abattoir, Siding 527, Berea Road, Durban, or to the abattoir of the Federated South African Meat Industries, Maydon Wharf, Durban.

A Successful Farm Demonstration:—

[Continued from page 92.]

The difference in yield between the Sunn hemp plots and the untreated plots is therefore 1,417 lb., i.e., approximately 7 bags. Since the treated and untreated plots together comprised one morgen each, the difference in yield amounts to 7 bags per morgen. The only extra expense which this increased yield entailed was the cost of 60 lb. of Sunn hemp seed.

It must also be noted that weeds grew on the untreated plots, whereas the Sunn hemp plots remained free. The Sunn hemp therefore not only enriched the soil for the subsequent wheat crop, but also effectively controlled weeds. The fact that grasses and weeds which are susceptible to eelworm infestation could not grow on the Sunn hemp plots, must not be overlooked.

The yield from plot No. 10 was particularly low. This may partially be ascribed to the fact that this plot lies on the edge of the land, and probably suffered more from birds than the other plots. The same applies to plot No. 1. Even if plots Nos. 1 and 10 were excluded, the difference in yield in favour of the Sunn hemp plots would still be 5 bags per morgen. At an extra cost of £1 (for 60 lb. of Sunn hemp seed) at least 5 bags of B1 wheat were gained. Estimated at 36s. 9d. per bag, that amounts to £9. 3s. 9d. more or a net profit of £8. 3s. 9d. per morgen.

New Bulletins.

Reprints from Farming in South Africa, 1944.

No. 22.—Groundnuts, Lucerne and Tef Seed.

No. 24.—Guaranteed Seed.

No. 25.—Storage of Seed and Control of Insects in Stored Seed.

No. 26.—How to Test Seed at Home.

(Obtainable from the Editor of Publications, Department of Agriculture Pretoria.)

Remittances of 6d. or less may be in the form of penny postage stamps (or 2d.), but larger amounts should be in the form of postal orders, cheques, etc.

Feather Picking and Cannibalism in Poultry.

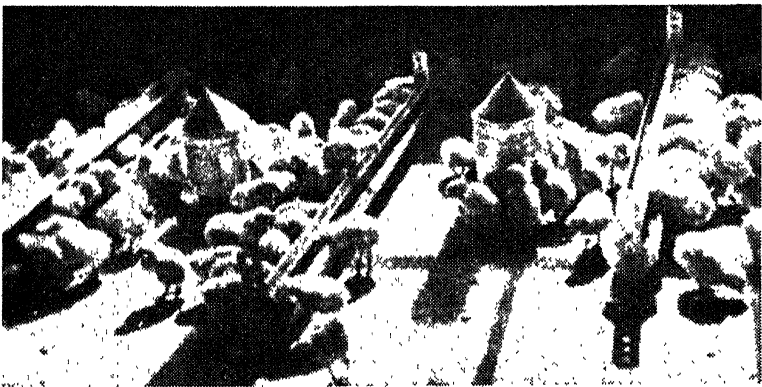
E. C. Sanders, Lecturer in Poultry, College of Agriculture,
Potchefstroom.

FEATHER PICKING and cannibalism are often the bugbear of many a chicken raiser, and the vices usually manifest themselves among the pullets and full-grown flock during the hot months of the year.

Causes of these Vices.

The initial causes of these vices must be sought among the following factors:—

Overcrowding.—Probably no single mistake is more common than the tendency to crowd large numbers of chickens into the brooder house and to congest laying houses with hens. Cannibalism is increased when more than 400 chickens are kept in a unit and it is never advisable to keep more than 200 laying hens together in one group.



Ample hopper space and drinking fountains are a necessity in the brooder house.

Inadequate hopper space.—On most poultry farms it is the exception rather than the rule to find that the birds, both adult and young, are supplied with sufficient hopper space. The result is that the weaker ones are driven away and have to wait until the strong ones have had their fill. This leads to hunger, irritability and cannibalism.

Heat and ventilation.—A hot, stuffy brooder house, badly ventilated and low lying houses most definitely play an important rôle. Under these conditions the birds become irritable and this in the case of hens leads to feather picking and toe, tail and wing pecking in chickens.

Too few nests.—During the season of maximum production many hens are often forced to lay on the floor in an exposed place and while the egg is being laid the membranes of the vent protrudes. Their fleshy appearance tempts the birds to peck at them with the result that blood is drawn and cannibalism follows.

Prolapse.—This condition invariably results in cannibalism, appearing frequently among early maturing pullets in which the muscles have not developed strongly to stand the strain of egg production.

Malnutrition.—Rations that are out of balance and lacking in various nutritional substances lead to abnormal appetites and cravings.

Palatability of feeds.—Mashes which are compounded with finely ground meals and are dusty, are not palatable to poultry. This leads to decreased feed consumption and unsatisfied appetite, with serious results.

Controlling Cannibalism and Feather Picking.

Attention must be given to the following points in any attempt to control these vicious habits:—

Space in brooders and laying houses.—In the brooder house allow 50 to 60 square feet per 100 chickens and this space must be increased as they grow older. Under the brooder about 7 square inches of floor space must be allowed per chicken and it is not advisable to keep more than 350 to 400 chicks under one canopy. In the laying house 3 to 4 square feet of floor space per bird is necessary.

Feeding space.—Supply sufficient feeding space. The following may serve as a guide. Hoppers should be so constructed that the birds feed from both sides.

1 to 2 weeks old—one 4-foot hopper per 100 chickens.

2 to 10 weeks old—two 4-foot hoppers per 100 chickens.

10 weeks and older—two 5-foot hoppers per 100 fowls.

Heat and ventilation.—Per unit of weight poultry require more fresh air than any other farm animal. Start the chicks under a well ventilated hover registering about 90° F. and keep the brooder house cool and well ventilated, i.e. registering about 65° F. When the surroundings are cool, the chicken's appetite is stimulated, and this is the main reason why chickens hatched during the winter months grow much better than those hatched late in the season. As the chicks grow older, the brooder temperature is dropped about 5° each successive week. In the common laying house with flat roof the temperature often rises to 90° F. and higher during the summer days. This, apart from increasing feather picking and cannibalism, also has an ill effect on feed consumption and the assimilation of lime and phosphorus and their secretion during egg-shell formation. The type and kind of roofing and ventilation must thus be given careful attention during the construction of laying houses.

Nests.—Supply one nest with plenty of straw for every 5 hens in a house.

Nutrition.—Feed grain after the chickens are 8 weeks old—in separate troughs, if possible, so that the birds may help themselves. This lowers the protein content of the total ration, making it less "forcing", and it gives the birds a chance for better body and muscular development before egg production starts. In strong hens the incidence of prolapse is low.

Research work indicates that the incidence of cannibalism and feather picking is very much higher on rations containing a high percentage of mealie meal than it is on rations containing a considerable amount of oats. It would thus be advisable to feed oats as part of the grain ration. Green feed must be supplied in ample quantities as it provides variety in the ration and may supply unknown nutritional factors necessary for good feather growth and the preven-

D.D.T.

R. du Toit, Division of Veterinary Services.

THE extensive publicity which D.D.T. has received throughout the world since its potent insecticidal actions were first realized in 1942, has led to many conflicting reports regarding its actions and uses. In the Union considerable confusion apparently exists in the minds of the public regarding its efficacy for various species of parasites. In order to forestall disappointment in some cases and temper false expectations in others, when this insecticide does become available, the following remarks are offered as to *the forms in which this new insecticide should be used and the methods of application for the control of certain external parasites of domestic animals.*

At the outset it must be stressed that although experimental work on the control of external parasites with D.D.T. has been conducted up to the limit of the personnel available in these difficult times and of the limited supplies of the insecticide allocated for the purpose, insufficient time has elapsed to investigate all its possibilities or even to report authoritatively on its actions on the parasites investigated. The object of this short report is to indicate the ways in which this insecticide should be used and what may be expected from it in the light of present knowledge.

Nature of D.D.T.

A fair degree of uniformity in the manufacture of D.D.T. in concentrated form and suitable for the making of insecticidal sprays, etc., has been reached and certain standard specifications have been suggested to which the drug should conform. At the moment the tendency appears to be to produce a concentrated product containing approximately 70 per cent. of the para-para isomer, or active form, known as technical grade D.D.T. concentrate, which will form the basis of insecticides. This product is a white granular powder which is greasy to the touch and has a sweet, almost "fruity", smell. It is entirely insoluble in water but soluble to a varying degree in oils and organic solvents.

Forms in which D.D.T. should be Supplied for Insecticidal Purposes.

For the purpose of destroying or controlling parasites of animals, insecticides containing D.D.T. should conform to *one of the following three specifications* depending upon the nature of the parasite and its location on or off its host.

(1) *Dusts containing D.D.T.*—The basis of these insecticidal dusts consists of some inert substance such as talc, kaolin, etc., in very fine powder form into which has been mixed by special processes either 5 per cent. or 10 per cent. technical grade D.D.T. concentrate to give a content of $3\frac{1}{2}$ per cent. or 7 per cent. of pure active D.D.T. Such dusts should be free flowing and show no tendency in the dry state to form lumps.

(2) *Sprays containing D.D.T.*—Paraffin or paraffin plus some organic solvent, to increase the solvent power of the paraffin, generally forms the basis of such sprays. Into the solvent is dissolved sufficient technical grade D.D.T. to give a concentration of 5 per cent. or more of the pure active D.D.T.

Certain modifications are possible, such as the inclusion of a large amount of a good organic solvent and a very much higher

concentration of D.D.T. In such cases the user dilutes the concentrated spray to the concentration desired, paraffin generally being used as diluent. On account of the rather slow action of D.D.T. on insects other insecticides possessing a rapid paralyzing effect, such as pyrethrins, may be included, in which case the concentration of D.D.T. may be reduced.

In all cases such sprays should be clear and transparent and capable of being atomized in a hand type spray such as is used for household purposes.

(3) *Emulsions and emulsifiable oils containing D.D.T.*—The essential constituents in the case of emulsions include an oil or organic solvent into which the D.D.T. has been dissolved, together with an emulsificant, which may be likened to a soap, and water, which forms the diluent. In such emulsions the oil should be dispersed in very fine droplets. Depending upon the degree of dilution, these emulsions may have the appearance of an ointment, a cream or milk.

In the case of the emulsifiable oil the ingredients are essentially the same as the above, but water is not included and the components are carefully balanced to produce a clear fluid. Such emulsifiable or miscible oils possess the property of forming emulsions when diluted with water.

The Choice of a Suitable Insecticide Containing D.D.T. and its Method of Use.

It is extremely important in using D.D.T. for the control of parasites to select one or other of the above-mentioned three forms which will produce the maximum effect and at the same time not injure the host, if the parasite it is intended to combat be such as to make it imperative to attack it only on its host.

The spraying or application of D.D.T. dissolved in paraffin or any organic solvent on to animals should be avoided at all costs as these solvents in themselves may result in extensive skin injury. Straight solutions of D.D.T., or spray, are intended solely for the control of insects or parasites which are free living or which at certain stages in their life histories lend themselves to attack in buildings, etc. House flies, stable flies, mosquitoes, fleas and certain stages in the developmental cycle of ticks and mites may be effectively controlled by spraying those places in which they occur away from their hosts.

Experience is necessary and a knowledge of the life histories and habits of the particular species of parasites is of great value in applying the spray to those places where it will exert its maximum effect. For the control of fleas, applications of the spray to floors and especially sheltered places such as crevices in wainscoting, under mats and carpets, etc., where the larval and nymphal stages occur and the adults hide, will give the best results. In the case of flies the spray may be directed on to ceilings and walls, hanging lamps, bell cords, etc., or other places where the insects rest. Wastage of spray and unnecessary soiling of windows may be obviated by painting the spray thinly (at the rate of 1 gallon per 1,000 square feet) on to window ledges just below the panes of glass or on to wire screens where flies are likely to alight sooner or later.

In the case of the insecticidal dusts containing D.D.T. the original intention was to apply the insecticide suitably diluted directly to human beings, or in situations where human beings could make contact with it, in a form not likely to produce injury. In

this way it has been used with great success for the control of lice on individuals or of bedbugs in bedding, rooms, etc.

From the point of view of use for animals, dusts would appear to have a somewhat restricted application due, principally, to difficulties in applying them effectively to the skins of animals and holding them there. Our experience has indicated that in the dry form D.D.T. is not quite as effective on certain species of parasites as in the liquid form and emulsions are in general preferable. However, for the control of fleas and lice on dogs, cats and fowls, dusts may be used with advantage. They are applied by means of insufflators or sprinklers of the pepper-pot type or by tying up a small quantity of the powder in a piece of muslin and adopting the pounce-bag method of application. Keds on sheep may also be combated by this means although ticks display considerable resistance to D.D.T. in powder form.

Emulsions appear to offer by far the best method of applying D.D.T. directly to animals. In the form of emulsifiable or miscible oils, D.D.T. may be supplied in a highly concentrated form and can be readily diluted by means of water to the concentration required. In this form the insecticide is highly active and at the proper concentrations is entirely innocuous when applied to the skins of animals. Furthermore, it may be used for the spraying of buildings, etc., where such an emulsion could take the place of the usual spray.

Considerable work has been done by the Division of Veterinary Services in elaborating a formula for an emulsifiable oil containing D.D.T. suitable for application to animals. The necessary ingredients, especially in regard to emulsificants, have been difficult to obtain on account of war conditions and recourse had to be had to the materials that were available. Fairly satisfactory progress has been made, however, and it is hoped to release in the near future such a soluble oil which is intended principally for use on animals, but which may also be used as a spray in dairies, byres, etc., where a certain amount of soiling of walls is of no great moment.

The miscible oil in question has certain undesirable features, principal amongst which is a certain amount of stickiness due to unsaponified resin, but this will be improved on in time as other materials become available. A few general remarks regarding its use, however, would not be out of place.

Depending upon the species of parasite it is intended to combat, a final dilution of a 2.5 per cent. or 5 per cent. pure D.D.T. content is aimed at. In making the emulsion the following procedure should be adopted to ensure good emulsification; equal parts of the concentrated miscible oil and water are thoroughly mixed by shaking in a suitable container until a white creamy emulsion results. Thereafter 6 additional parts of water are added to give a 2.5 per cent. content or 2 additional parts to give a 5 per cent. D.D.T. content. Only slight mixing of the additional water added is necessary to produce a smooth emulsion.

Methods of Using the Emulsion.

Laboratory tests and field trials with the emulsion at present in progress have indicated that a considerable degree of protection against blowfly strike is afforded to woolled sheep. The emulsion, diluted by the addition of 3 parts of water to give a concentration of 5 per cent. D.D.T., is sprayed into the wool of sheep in the region of the crutch and around the root of the tail, and worked in by means

of the fingers. The best time to apply the treatment is shortly after shearing or, if it is the practice to dip sheep a fortnight or 3 weeks after shearing, shortly after dipping. In the case of unshorn sheep the application may be made just before the onset of the blowfly season, which generally occurs shortly after the first summer rains. The observations made to date indicate that the protection afforded is of considerable duration and in most cases a second application appears to be necessary only about 3 months after the first, or shortly before the onset of the second wave of blowfly activity which, depending upon rain, generally occurs in February or March.

In the case of rams applications of emulsion may be necessary around the bases of the horns and sides of the head as well, because animals are frequently struck in these sites. Hamels and rams may also be treated around the prepuce where soiling of the wool by urine creates conditions favourable for blowfly strike.

For protecting cattle against attacks by hornfly, a scourge of the coastal regions, spray applications of the 5 per cent. concentration around the bases of the horns and along the backs to the root of the tail have indicated that protection is afforded for periods of up to 6 weeks. As hornflies alighting on these treated areas are killed, regular applications at monthly intervals should go far towards reducing the incidence of these flies to negligible proportions in time.

For the control of ticks, lice and fleas on various species of domesticated animals, spray applications of the emulsifiable oil diluted to a 2.5 per cent. D.D.T. content have yielded excellent results. No ill effects have resulted from spraying the entire bodies of animals with this dilution. The treatment may be repeated at weekly intervals, if desired.

In conclusion it may be stated that the method by which D.D.T. kills parasites has as yet not been finally determined, although there is evidence to indicate that it acts upon the nervous system. The drug is readily absorbed through the external covering of insects and particularly is this true in so far as the foot pads of flies are concerned. It is very stable in nature and is therefore capable of exerting its effects over considerable periods, but it must be borne in mind that D.D.T. is a slow-acting poison showing no repellent effect so that the sudden and spectacular disappearance of parasitic pests against which it has been used, must not be expected.

Feather Picking and Cannibalism in Poultry —

[Continued from page 112.]

tion of cannibalistic tendencies. The poor quality rations which are under present conditions being fed to poultry must largely be held responsible for the increase of this vice, especially among adult flocks.

Palatability of feed.—The palatability of mashes may be increased by compounding them with coarsely ground meals. Wetting a dusty mash adds to its palatability and it is advisable to feed a wet mash once a day. The mash left over in the hoppers from the previous day should be used for the above and fresh mash put into the hoppers.

Apart from the above factors, good management and the ability of the farmer to notice faults will help him to prevent outbreaks of these vices. The saying that the farmer's eye fattens his ox, is indeed applicable to poultry as well.

The Farm Home.

(A Section devoted mainly to the interests of Farm Women.)

How to make Bound Buttonholes and Set-in Pockets.

Miss Lena van Staden, Division of Veld Conservation and Extension.

BOUND buttonholes and set-in pockets give a frock or jacket a very attractive, neat appearance. They are very effective on washing frocks.

Bound buttonhole No. 1.

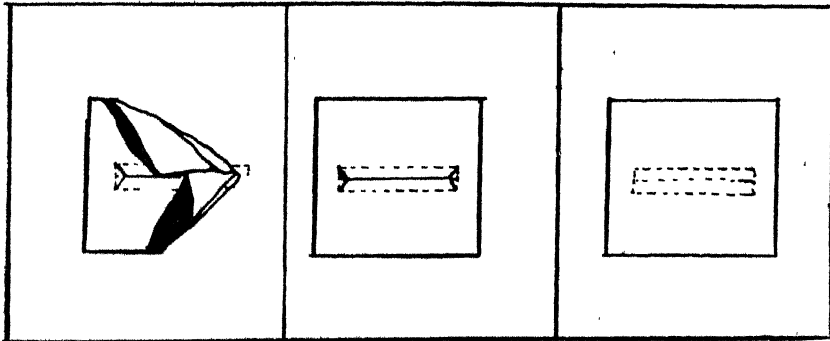


Fig. A.

Fig. B.

Fig. C.

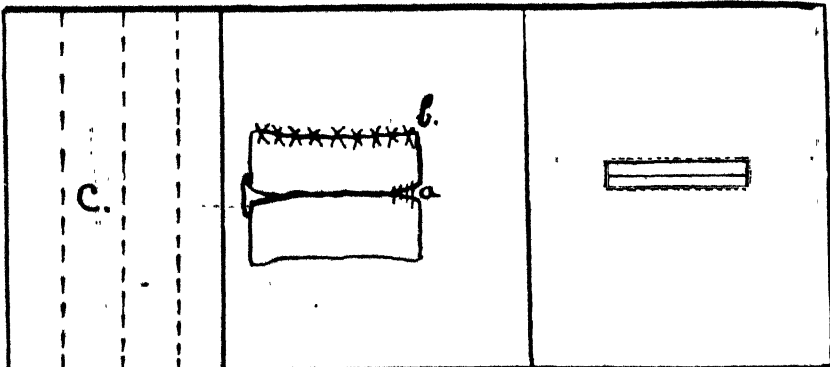


Fig. D.

Fig. E.

Just like the hand-made buttonhole, this type of buttonhole is made through two thicknesses of material, e.g. on a jacket or frock with a facing. In the case of a jacket, the buttonhole is also made through the stiffening.

Steps in the Making of a Buttonhole.

Mark the position and size of the buttonhole with tailor's chalk or running stitches. Pay attention to the spacing of the buttonholes

and their distance from the edge. Buttons should not extend over the edge when the garment is buttoned.

The strip which is used, should be on the straight. Cross-way pieces can also be used and look very attractive, especially in striped or checked material.

Take a strip $1\frac{1}{2}$ inches longer than the buttonhole, the length depending on the size of the buttonhole, and 2 inches wide.

Tack the strip on, right sides together, and stitch (see No. 1, Fig. A). The stitching should be straight and at all points equidistant from the line of the buttonhole, with the corners rectangular. Cut the material along the line of the buttonhole. Cut the corners in as shown in Fig. B. Fold the bindings through onto the wrong side (Fig. C).

Fold the binding into position on the wrong side so that the two bindings are of the same width on the right side and just touch. On the wrong side a small fold is thereby formed at each corner of the buttonhole. Stitch the folds securely to the triangle which is formed by the slits in the corners [see Fig. D. (a)].

Cut away the unnecessary material and sew the binding down all round, using cross-stitch, as shown in Fig. D. (b). For additional strength, either stitch round the buttonhole by machine on the right side or sew the binding down securely on the wrong side. At the corners the stitching is done on the binding and at the top and bottom of the buttonhole just off the binding (see Fig. E). Fold the facing (c) back over the buttonhole and tack it down. Make an opening in the facing, cutting through the buttonhole from the right side. Slit the corners, fold the material back and hem on the wrong side. Alternatively, the slit may be longer so that an oval is formed when the raw edges are turned in. The right side of the finished buttonhole is shown in Fig. E.

Bound buttonhole No. 2.

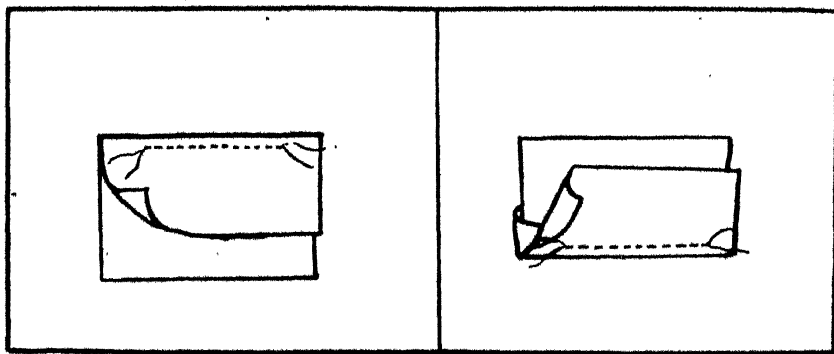
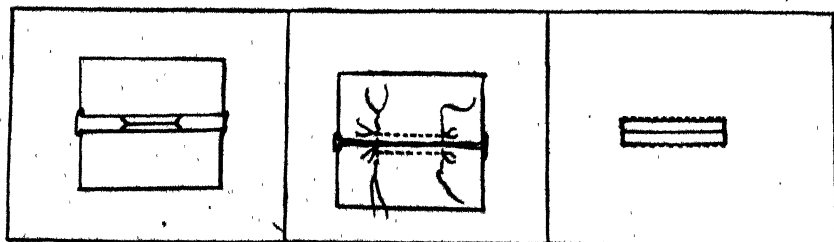


Fig. A.

Fig. B.



Mark the line of the buttonhole. Cut a strip 1 inch longer than the buttonhole and 2 inches wide, and fold it double. Place the folded edge of the binding along the line of the buttonhole on the right side of the article.

Measure a $\frac{1}{4}$ inch from the fold towards the edge of the binding. Fold the binding along this line back on itself and make a tuck of $\frac{1}{8}$ inch. Make a similar tuck on the other side of the buttonhole. See No. 2., Figs. A and B. Cut the buttonhole open, as shown in No. 2, Fig. C. Pull the binding through to the wrong side. Stitch across the corners and round the buttonhole as shown in Fig. D. The tuck in the binding forms the binding of the buttonhole (see Fig. E).

The Set-in Pocket.

Make the set-in pocket in the same way as buttonhole No. 1. It should be about $3\frac{1}{2}$ inches long. A strip of material, twice the depth of the pocket and 4 to 5 inches wide is used to make the binding. In Fig. 1, A is the frock and B the strip of material—right sides together. Make the opening at one end of the strip. Follow the same procedure as for buttonhole No. 1 up to the point where the stitching round the buttonhole is done. In the case of the pocket, the stitching is done from *a* to *b* to *c* to *d* (see Fig. 3). Now fold the strip (B. in Fig. 1) double and stitch from *d* to *a*. Stitch the pocket together at the back (see Fig. 3).

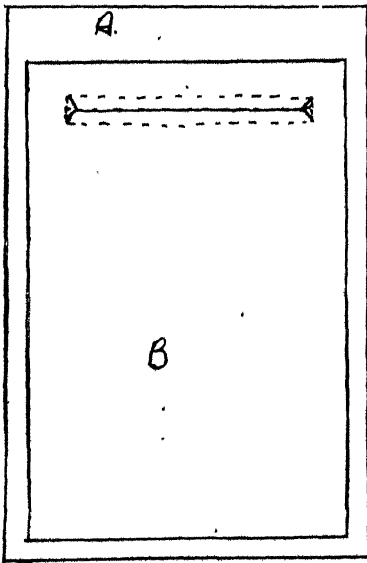


Fig. 1.

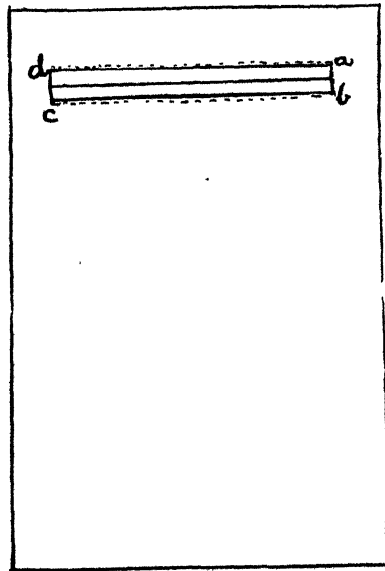


Fig. 2.

Pocket with Upright Flap.

For an example of this pocket see Fig. 4. Make the pocket in exactly the same way as the one in Fig. 2. Take an extra strip $1\frac{1}{2}$ inches wide and half an inch longer than the opening of the pocket. Fold it double, lengthwise, and stitch up the sides. Turn it inside out and iron flat. This forms the flap C in Fig. 5. Place C between A and B on a level with the line where the opening of the pocket will be, stitch, and cut open as for buttonhole No. 1, Fig. B. Pull

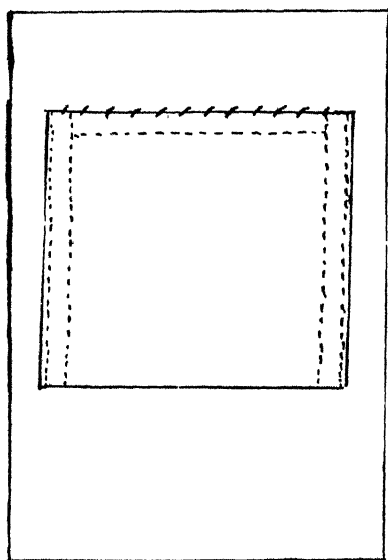


Fig. 3.—Wrong side of pocket.

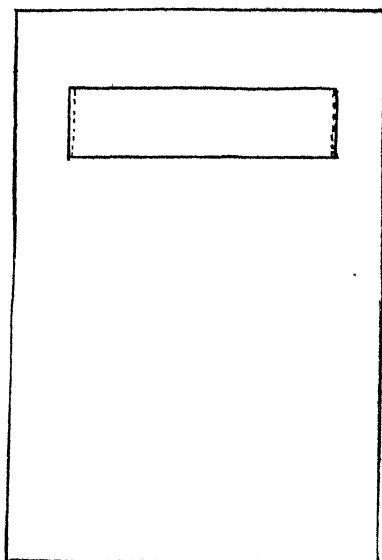


Fig. 4.

B through the opening. C will then be in an upright position. Stitch the pocket together at the back in the same way as in Fig. 2 and Fig. 3. Stitch the flap down on either side as shown in Fig. 4.

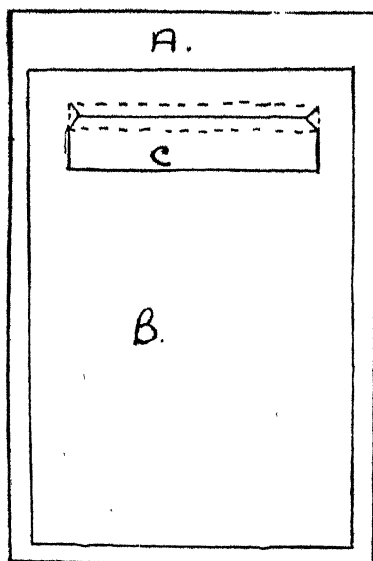


Fig. 5.

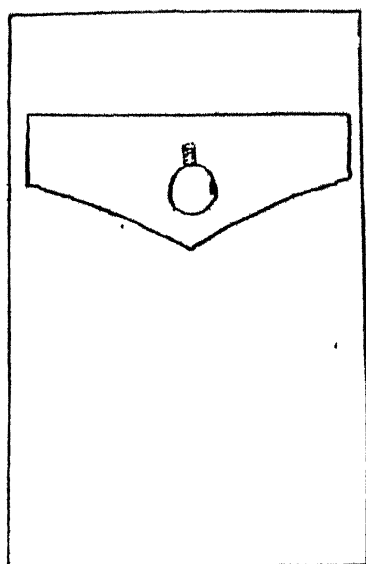


Fig. 6.

Pocket with Long Flap.

The pocket in Fig. 6 is made in exactly the same way as the one in Fig. 4. In this case place the flap on the upper side of the opening.

Crops and Markets

A Statistical and Economic Review of South African Agriculture

by

The Division of Economics and Markets

Vol. 25

FEBRUARY 1946

No. 282

CONTENTS

	PAGE
Price Review for December, 1945	121
Index of Prices of Agricultural and Pastoral Products	122
Agricultural Conditions in the Union during December, 1945 ...	122
Maximum Prices of Eggs	123
Maximum Prices of Citrus Fruit	123
Maximum Prices of Lucerne Meal	123
Prices of Wine—1946 Season	123
Prices of Pineapples for Canning	123
Third Croo Estimate of Expected Winter Cereals, 1945-6 Season	123
Prices of Dairy Products	125
Maximum Prices of Bonemeal, Bones and Stock Licks	125
Further Control Measures for Mealies and Wheat	125
Prices, Tables and Index	126

Price Review for December, 1945.*

Fruit.—The markets were supplied with larger quantities of deciduous fruit, particularly peaches and plums which were in keen demand and realized high prices.

The bulk of the deciduous fruit consisted of local offerings although consignments from the Deciduous Fruit Board increased during the month.

Larger quantities of pineapples, grénadillas and especially mangoes reached the markets, whilst smaller quantities of papaws and bananas were offered. Large quantities of watermelons and span-speks on the Pretoria and Johannesburg markets were sold at fairly satisfactory prices.

Potatoes.—Reasonable quantities of potatoes were offered, although towards the end of the month offerings decreased and realized maximum prices throughout.

Onions.—Good supplies of onions, especially Cape consignments, were offered, but prices nevertheless increased. Cape onions were 15s. 3d. per bag on the Johannesburg market, 15s. 6d. per bag on the Cape Town market and 15s. 7d. per bag on the Durban market.

Tomatoes.—Offerings of locally produced tomatoes increased substantially during the month, whilst consignments of Transvaal

* All prices mentioned are averages.

tomatoes decreased. Offerings were often of poor quality. Prices declined gradually.

Vegetables.—Offerings were somewhat irregular but still satisfactory in general.

Fodder.—As a result of the extensive drought the fodder position was very critical. Lucerne hay was scarce, whilst practically no teff and oat hay was offered.

Index of Prices of Agricultural and Pastoral Products.

THIS index (see table elsewhere in this issue) remained unchanged for December, namely, at 172.

In regard to the various groups of products, "Other Field Crops" declined from 379 to 341, whilst "Slaughter Stock" declined by three points from 186 to 183.

"Poultry and Poultry Products", on the other hand, increased from 173 to 202.

Agricultural Conditions in the Union During December, 1945.

Rainfall.—Except for isolated showers in the Transkei, parts of Natal and the highveld and middleveld of Transvaal, the Union in general suffered from very critical drought conditions during December.

Grazing and livestock.—Grazing deteriorated, whilst supplies of drinking water continued to give in, and livestock losses occurred in nearly all parts of the Union. In some places such as the Border area of the Cape Province and in the native reserves in Natal, livestock losses were exceptionally heavy.

Crops.—As result of the devastating drought, as well as frost and excessive rain in the south-western Cape Province, the yields of *winter cereals* will be far below expectations. The November crop estimate for wheat and oats (which appears elsewhere in this issue) shows a further drop as compared with the October estimate. In the case of wheat the estimate is 163,000 bags below the October estimate.

According to reports, cold weather and frost caused damage especially in the south-western Cape Province, the Karoo and the Orange Free State, while in the Transvaal crops were severely damaged by hail.

In the case of oats the November estimate is 370,000 bags less than that of the previous month. The oat crop of the Orange Free State shows the greatest decrease owing to the fact that farmers were compelled to graze their winter cereals as a result of the continuous drought. Cold weather conditions and frost during November also caused damage in this case.

The prospects for *summer crops* are also poor. Farmers were, on the whole, not in a position to plough, and even where they could the young crops suffered as a result of the drought.

The *sugar cane crop* in Natal also suffered severely from the drought, while hail caused considerable damage to tobacco, vegetable and fruit crops in the Transvaal.

Maximum Prices of Eggs.

THE maximum wholesale and retail prices of eggs in the controlled areas, as fixed on 30 November 1945 (see *Crops and Markets*, January 1946), have been increased by 3d. per dozen for all grades as from 14 December 1945. (See *Government Gazette Extraordinary* of 14 December 1945.)

Maximum Prices of Citrus Fruit.

The maximum out-of-season prices for citrus fruit, as fixed on 26 October 1945, have been increased as from 14 December 1945. (See *Government Gazette Extraordinary* of this date.)

Maximum Prices of Lucerne Meal.

The maximum prices of 1st grade lucerne meal, as fixed on the 23 November 1945 (see *Crops and Markets* 1 January 1946), have been increased by 9d. per 100 lb. as from 21 December 1945 and are at present 9s. 6d. per 100 lb. when manufactured from baled lucerne hay and 9s. per 100 lb. when manufactured from unbaled lucerne hay. The actual railage paid can be added to the above-mentioned prices. (See *Government Gazette Extraordinary* of 21 December 1945.)

Prices of Wine—1946 Season.

The minimum price of wine for the 1946 season has been fixed at £8 per leaguer free-on-rail wine producer's station, and the price of quality wine at £12 per leaguer.

The corresponding minimum and quality prices for wine during the 1945 season were £7. 10s. and £11. 10s. per leaguer, respectively. (See *Government Gazette Extraordinary* of 31 December 1945.)

Prices of Pineapples for Canning.

The following are the present maximum prices per ton at which pineapples may be sold to canners.—

	£	s.	d.
Pineapples 3½ inch and larger, with tops ...	6	10	0
Pineapples 3½ inch and larger, without tops	7	0	0

The above maximum prices (per ton of 2,000 lb.) are free-on-rail producer's station and are 10s. per ton higher in each case than the corresponding prices for the previous season. (See *Government Gazette Extraordinary* of 28 December 1945.)

Third Crop Estimate of Expected Winter Cereals, 1945/46 Season.

ACCORDING to reports received from crop correspondents at the end of November and based on conditions prevailing during that month, the wheat, barley, oat and rye crops are estimated as follows as compared with the October estimates. (The threshing results of wheat

and the final crop estimates for barley, oats and rye are also given for the previous season):—

WHEAT.

	Threshing results, (bags, 200-lb.) 1944/45.	October estimate 1945/46. (bags, 200-lb.)	November estimate 1945/46. (bags, 200-lb.)
South-western Cape Province....	1,078,000	950,000	872,000
Other areas.....	1,588,000	1,524,000	1,461,000
TOTAL CAPE PROVINCE....	2,666,000	2,474,000	2,333,000
Transvaal.....	491,000	436,000	424,000
Orange Free State.....	267,000	319,000	309,000
UNION TOTAL.....	3,424,000	3,229,000	3,066,000

BARLEY.

	Final estimate 1944/45. (bags, 150-lb.)	October estimate 1945/46. (bags, 150-lb.)	November estimate. 1945/46. (bags, 150-lb.)
Cape Province.....	738,000	594,000	609,000
Transvaal.....	66,000	71,000	71,000
Orange Free State.....	5,000	4,000	3,000
UNION, TOTAL.....	809,000	669,000	683,000

OATS.

	Final estimate season 1944/ 45. (bags, 150-lb.)	October estimate 1945/46. (bags, 150-lb.)	November estimate 1945/46. (bags, 150-lb.)
Cape Province.....	1,415,000	1,236,000	1,086,000
Natal.....	6,000	5,000	5,000
Transvaal.....	209,000	236,000	207,000
Orange Free State.....	618,000	649,000	458,000
UNION, TOTAL.....	2,248,000	2,126,000	1,756,000

RYE.

	Final estimate 1944/45. (bags, 150-lb.)	October estimate 1945/46. (bags, 150-lb.)	November estimate 1945/46. (bags, 150-lb.)
Cape Province.....	268,000	218,000	241,000
Natal.....	1,000	1,000	1,000
Transvaal.....	4,000	2,000	1,000
Orange Free State.....	18,000	16,000	13,000
UNION, TOTAL.....	291,000	237,000	256,000

Prices of Dairy Products.

As a result of the drought still prevailing in some of the milk-producing areas of the Union, the Dairy Industry Control Board regarded it necessary to introduce the winter premium on butterfat and cheesemilk and the present price of factory milk during the month of January as well.

During January 1946 producers will, therefore, again receive a premium of 4d. per lb. butterfat and 2d. per gallon (or 5½d. per lb. butterfat) of cheesemilk, while the price which producers will receive for factory milk will remain unchanged at 13¼d. per gallon (or 3s. 0¾d. per lb. butterfat).

Maximum Prices of Bonemeal, Bones and Stock Licks.

THE following are the maximum prices at which manufacturers may sell bonemeal stock licks in any quantity:—

Maximum price, free-on-rail manufacturer's station.

Per ton.

1. Bonemeal.

A. Solvent-extracted, containing not less than 24 per cent. P_2O_5 and 30 per cent. protein £14 0 0

B. Other containing not less than 22½ per cent. P_2O_5 and 24 per cent. protein £13 10 0

2. *Degelatinized Bone Flour* £13 5 0

3. Stock Licks.

A. Salt-free phosphate lick £16 10 0

B. Standard phosphate-salt lick £12 5 0

C. Phosphate-salt-iron sulphate lick £13 10 0

D. Phosphate-salt-iron oxide lick £15 0 0

These prices are unchanged as fixed on 12 January 1945 (see *Crops and Markets* of March 1945) except that these maximum prices include the bags which now become the property of the owner and no additional charge or deposit may be charged for these.

The maximum prices at which dealers may again sell bonemeal and stock licks are the above prices plus 5 per cent. plus railage and/or transportation costs. Dealers again receive 5 per cent. discount from manufacturers on the above prices.

The maximum prices which manufacturers may pay for bones remain unchanged, viz., 5s. for fresh bones and 7s. for dry bones per 100 lb. free-on-rail sender's station in each case. (See *Government Gazette Extraordinary* of 14 December 1945.)

Further Control Measures for Mealies and Wheat.

Mealies.—The manufacture of pure white mealimeal has been prohibited as from 21 December 1945 and from this date no one may manufacture mealimeal containing less than 20 per cent. by weight of yellow mealimeal, while crushed mealies must be manufactured entirely from yellow mealies.

Furthermore, the restriction determining that only unsifted mealimeal must be manufactured, continues to remain in force. Producers, however, are not affected by this restriction and are

allowed to convert mealies into sifted mealie meal for their own use, or for their labourers or for use as stockfeed on the farm.

No person, however, converting mealies into sifted mealie meal may sell the bran, or other by-products obtained, except to the Maize Control Board or somebody empowered thereto by the Board. (See *Government Gazette Extraordinary* of 14 December 1945.)

Wheat.—As from 1 January 1946 no other product except bread may be manufactured for sale from Nos. 1 and 2 unsifted meal. Other wheaten products like biscuits, cake, etc., can only be manufactured under the authority of a permit issued by the Wheat Control Board.

This measure became necessary as a result of the exceptionally small wheat crops obtained during the past two seasons. The rationing of mealies also caused the demand for wheaten bread to increase, so that it will be necessary to import at least 3½ million bags of wheat during 1946 in order to meet the demand. (See *Government Gazette Extraordinary* of 28 December 1945.)

Price of crushed and ground oats.—Maximum selling prices of crushed and ground oats have been introduced as from 28 December 1945, viz., 14s. 3d. and 12s. per 100 lb. net weight for 1st and 2nd grade crushed oats, respectively; and 15s. and 12s. 9d. for 1st and 2nd grade ground oats, respectively.

These prices include railage to the buyer's nearest railway station. (See *Government Gazette Extraordinary* of 28 December 1945.)

Index of Prices of Field Crops and Animal Products. (Basic period 1936-37 to 1938-39=100.)

SEASON (1 July to 30 June).	Summer cereals.	Winter cereals.	Hay.	Other field crops.	Pastoral products.	Dairy products.	Slaughter stock.	Poultry and poultry products.	Com- bined index.
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)		
WEIGHTS.	19	13	2	3	34	6	17	6	100
1935-49.....	92	107	96	89	79	102	106	92	93
1939-40.....	86	107	77	95	115	105	106	89	103
1940-41.....	109	113	106	156	102	108	110	104	108
1941-42.....	121	134	143	203	102	131	134	145	123
1942-43.....	160	149	144	159	122	147	167	173	146
1943-44.....	169	172	137	212	122	154	182	204	157
1944-45.....	184	183	160	230	122	177	172	187	163
1944—									
January.....	168	183	137	179	122	144	183	215	158
February.....	165	183	134	138	122	144	176	235	158
March.....	167	183	124	179	122	144	174	240	157
April.....	167	183	132	262	122	144	170	279	162
May.....	183	183	158	289	122	169	166	273	167
June.....	182	183	170	315	122	169	161	256	166
July.....	182	183	147	317	122	195	163	187	163
August.....	182	183	147	343	122	195	170	160	163
September.....	182	183	160	393	122	195	175	154	166
October.....	182	183	170	391	122	195	176	170	167
November.....	182	183	135	295	122	159	183	172	162
December.....	183	183	145	270	122	159	179	195	163
1945—									
January.....	184	183	177	250	122	159	178	206	163
February.....	184	183	171	235	122	180	171	225	164
March.....	184	183	182	245	122	180	171	237	165
April.....	184	183	173	246	122	180	169	263	166
May.....	199	183	173	237	122	184	163	272	170
June.....	199	183	190	320	123	184	169	262	172
July.....	199	183	191	315	118	210	174	210	170
August.....	199	183	191	333	118	210	178	180	169
September.....	199	183	187	372	118	210	182	165	170
October.....	199	183	189	333	118	210	186	165	171
November.....	199	190	194	379	118	204	186	173	172
December.....	199	190	194	341	117	204	183	202	172

(a) Maize and kaffircorn.
(b) Wheat, oats and rye.
(c) Lucerne and teff hay.

(d) Potatoes, sweet potatoes,
onions and dried beans.
(e) Wool, mohair, hides and skins.

(f) Butterfat, cheese milk and
condensing milk.
(g) Cattle, sheep and pigs.
(h) Fowls, turkeys and eggs.

CROPS AND MARKETS.

Average Prices of Onions and Sweet Potatoes on Municipal Markets.

SEASON (1 July to 30 June).	ONIONS (120 lb.).						Sweet Potatoes. (120 lb.).		
	Johannesburg.		Cape Town.	Pretoria.	Durban.		Johan- burg. Table.	Durban.	Cape Town.
	Trans- vaal.	Cape.	Cape.	Cape.	Local.	Cape.			
1938-39.....	s. d. 8 3	s. d. 8 10	s. d. 7 4	s. d. 7 10	s. d. 8 6	s. d. 9 6	s. d. 5 7	s. d. 4 8	s. d. 5 3
1939-40.....	6 3	9 10	7 3	9 11	9 8	10 5	5 7	5 9	5 0
1940-41.....	12 5	12 3	9 10	11 11	11 2	12 7	7 3	6 4	5 5
1941-42.....	10 5	13 11	10 4	13 10	13 0	14 3	9 10	7 1	8 4
1942-43.....	13 8	14 0	12 6	14 7	12 9	14 5	9 8	8 1	8 5
1943-44.....	16 2	18 9	15 1	17 4	19 1	19 2	12 0	10 9	10 7
1944-45.....	14 7	18 7	14 8	18 1	18 8	19 5	17 3	15 1	16 3
1945—									
January.....	12 9	13 1	9 11	14 8	12 3	13 5	18 2	7 8	14 7
February.....	13 5	13 10	9 9	10 4	12 2	14 0	16 0	8 1	10 8
March.....	13 10	15 2	11 4	14 9	18 9	17 0	12 6	9 6	12 5
April.....	17 8	17 5	14 6	16 9	12 6	17 8	9 11	7 5	9 1
May.....	16 4	17 11	12 0	18 0	19 11	20 10	10 4	7 1	11 4
June.....	20 3	17 11	14 4	18 4	15 4	18 1	9 4	8 2	9 4
July.....	16 7	18 7	15 5	16 8	17 7	20 5	10 4	8 8	12 4
August.....	18 7	18 4	15 7	18 3	16 9	19 4	11 3	8 9	12 1
September.....	16 1	17 7	16 1	19 11	19 8	20 5	15 0	12 11	14 2
October.....	10 8	14 5	12 11	14 8	10 4	15 10	19 0	15 6	17 0
November.....	12 3	9 3	13 0	—	14 3	13 10	19 11	19 1	21 3
December.....	14 8	15 3	15 6	17 10	16 11	15 7	17 1	14 6	17 7

Average Prices of Lucerne, Teff, Kaffircorn and Dry Beans.

SEASON AND MONTH (b).	LUCERNE (per 100 lb.),			Teff Johan- nesburg (a) 100 lb.	KAFFIRCORN in bags (200 lb.).		DRY BEANS (200 lb.) bags.		
	Johannesburg (a).		Cape Town 1st grade.		F.O.R. producers' stations.		Johannesburg (a).		
	Cape.	Trans- vaal.			K1.	K2.	Speckled Sugar.	Cow- peas.	Kid- ney.
1938-39.....	s. d. 3 10	s. d. 3 1	s. d. 4 0	s. d. 2 7	s. d. 13 1	s. d. 12 9	s. d. 25 0	s. d. 16 9	s. d. 24 2
1939-40.....	3 0	2 5	3 4	2 6	8 8	9 4	21 11	13 11	21 2
1940-41.....	4 2	3 5	4 3	3 3	15 6	17 0	30 0	16 8	27 11
1941-42.....	5 7	5 2	5 8	4 7	18 10	19 6	32 10	19 8	28 3
1942-43.....	5 5	6 0	7 4	5 5	24 10	24 10	34 0	25 8	24 2
1943-44.....	5 4	5 6	7 3	4 5	21 0	21 7	49 6	29 11	32 1
1944-45.....	6 4	5 4	7 2	4 9	18 8	18 8	88 7	39 6	70 6
1944—									
January.....	5 0	3 7	7 0	5 10	20 3	20 5	62 4	25 11	35 2
February.....	5 2	3 8	7 0	4 5	18 10	19 2	58 1	23 4	30 11
March.....	4 11	3 8	7 3	3 8	17 9	18 0	62 6	35 8	36 6
April.....	5 3	4 6	7 2	3 9	17 9	17 7	71 6	38 9	44 0
May.....	6 4	3 9	7 3	4 4	18 0	18 6	71 8	37 11	54 5
June.....	6 9	5 6	7 5	4 11	16 10	16 10	96 1	42 0	78 10
July.....	5 9	4 11	7 6	4 7	16 2	16 2	92 3	42 0	64 8
August.....	5 10	4 10	7 7	4 3	15 2	15 2	88 10	38 5	75 8
September.....	6 3	4 2	6 0	5 0	15 5	15 5	97 10	34 2	78 5
October.....	6 10	6 9	7 3	4 6	16 7	16 7	102 8	33 4	72 2
November.....	5 3	4 5	6 3	4 4	16 6	16 6	101 6	39 2	81 9
December.....	5 9	6 1	7 0	4 3	17 9	17 9	112 9	41 0	87 2
1945—									
January.....	7 3	5 7	7 3	4 1	23 1	23 1	118 8	45 11	98 2
February.....	7 0	6 9	7 6	—	22 0	22 0	122 3	45 3	95 3
March.....	7 2	5 10	7 3	5 5	22 0	22 0	107 9	42 11	89 3
April.....	6 10	—	7 8	5 2	22 0	22 0	109 11	53 4	104 8
May.....	6 9	5 7	7 6	5 5	20 6	20 6	111 1	61 7	97 1
June.....	7 6	6 9	7 9	5 8	20 6	20 6	102 2	67 11	95 2
July.....	7 6	—	7 9	5 9	20 6	20 6	105 8	67 1	80 10
August.....	7 6	—	7 9	5 9	20 6	20 6	93 7	66 3	80 7
September.....	7 4	—	7 9	5 9	20 6	20 6	87 0	67 2	74 8
October.....	7 5	7 6	7 0	5 9	20 6	20 6	91 2	70 8	65 3
November.....	7 6	6 9	—	6 6	20 6	20 6	106 3	68 7	79 1
December.....	7 6	—	—	—	20 6	20 6	104 3	61 7	69 6

(a) Municipal Market.

(b) Seasonal year for kaffircorn,
1 June-31 May.

Dry Beans, 1 April-31 March;

Lucerne and teff, 1 July-30
June.

Average Prices of Green Beans, Green Peas and Carrots on Municipal Markets.

SEASON (1 July to 30 June.)	GREEN BEANS (Pocket 20 lb.).			GREEN PEAS (Pocket 20 lb.).			CARROTS (Bag). (a).		
	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.
1938-39.....	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1940-41.....	1 8	2 3	2 0	2 4	1 9	1 2	3 8	2 6	6 1
1941-42.....	1 11	2 9	1 5	2 8	2 4	2 3	5 9	4 11	13 4
1942-43.....	2 7	3 10	2 6	3 11	3 3	3 4	8 5	8 11	17 2
1943-44.....	3 1	4 3	3 0	3 3	2 10	3 9	5 1	8 9	13 2
1944-45.....	3 8	4 11	4 1	4 11	4 10	4 11	9 11	11 1	20 2
1945-.....	3 7	5 1	4 1	4 9	4 1	5 5	8 3	9 11	19 10
January.....	1 10	0 11	2 4	4 3	1 9	6 7	7 7	3 1	10 2
February.....	1 7	3 4	2 3	5 5	6 9	7 4	7 8	6 11	19 1
March.....	2 3	4 11	2 6	7 7	12 0	6 7	9 5	6 3	25 4
April.....	1 11	2 8	1 10	4 4	6 6	4 0	8 6	13 9	19 6
May.....	3 3	5 3	2 3	5 9	9 11	3 1	9 5	8 7	21 6
June.....	4 3	4 2	5 0	4 9	7 9	3 8	10 0	10 10	13 9
July.....	9 10	7 10	5 10	8 2	11 7	3 8	10 1	16 4	20 11
August.....	7 4	6 4	6 10	5 8	7 10	5 5	13 4	17 11	12 11
September.....	3 1	5 9	4 1	2 8	4 1	2 4	7 5	12 8	16 8
October.....	3 8	5 4	4 9	4 4	3 6	7 7	9 6	10 10	20 11
November.....	1 6	3 4	2 4	9 0	4 0	9 4	9 8	8 8	16 4
December.....	2 4	2 3	2 8	12 1	—	12 5	10 9	7 10	13 10

(a) Weights of bags vary, but on the average are approximately as follows:—Johannesburg, 130 lb.; Cape Town, 90 lb.; and Durban, 120 lb.

Average Prices of Cabbages, Cauliflower and Tomatoes on Municipal Markets.

SEASON (1 July to 30 June.)	CABBAGES (Bag). (a)			CAULIFLOWER (Bag). (a)			TOMATOES (Trays 15 lb.).			
	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.	Johannesburg.			
							N.M. No. 1.	Other.	Cape Town.	Durban.
1938-39.....	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1940-41.....	3 10	3 0	3 10	3 0	1 8	3 5	2 2	1 3	1 8	0 10
1941-42.....	5 10	4 8	7 1	3 11	4 3	5 3	2 7	1 6	2 1	1 2
1942-43.....	8 10	5 5	11 5	5 9	5 7	7 11	3 1	1 9	2 3	1 6
1943-44.....	5 6	5 11	9 1	5 0	5 9	7 6	3 4	1 10	2 1	2 7
1944-45.....	11 1	7 4	17 6	9 2	6 2	12 1	5 5	2 9	3 7	2 0
1945-.....	9 7	6 11	13 5	7 5	6 6	9 8	4 1	2 0	2 8	1 0
January.....	6 5	5 2	14 6	5 4	2 6	—	4 3	1 6	2 2	1 2
February.....	7 5	7 8	22 2	6 8	—	—	4 7	1 9	2 9	2 3
March.....	13 4	10 6	25 7	10 4	8 11	15 6	6 8	3 3	2 5	2 5
April.....	11 3	10 11	22 8	9 1	8 5	12 2	5 11	2 10	3 1	2 4
May.....	11 11	7 10	18 0	10 5	8 2	13 10	5 6	2 10	3 8	2 5
June.....	12 2	8 9	12 0	11 10	10 2	11 11	4 10	2 6	4 0	1 8
July.....	9 10	8 10	8 5	7 8	7 2	7 2	4 7	2 4	2 10	1 0
August.....	8 11	6 7	7 1	5 1	6 2	7 1	3 5	1 7	2 4	1 5
September.....	12 11	8 1	14 1	14 4	6 5	18 11	3 3	1 8	2 8	1 2
October.....	13 6	7 8	13 0	13 10	4 6	—	4 8	2 6	2 10	2 1
November.....	7 11	7 9	12 9	6 1	5 1	—	5 1	2 5	8 11	2 7
December.....	9 3	5 11	11 10	14 3	5 2	—	6 4	2 8	4 2	2 3
January.....	8 0	4 9	15 8	6 8	—	—	6 1	2 6	2 7	2 2
February.....	7 8	8 6	22 4	9 5	6 11	—	3 0	1 2	3 1	1 1
March.....	8 5	10 5	24 1	8 8	—	8 0	3 4	1 5	2 5	2 4
April.....	8 7	7 11	14 8	7 7	9 7	11 4	3 4	1 5	2 6	1 7
May.....	7 6	5 4	11 2	7 3	6 5	10 10	4 0	1 10	2 4	1 10
June.....	8 11	4 8	10 6	11 7	7 7	14 10	3 11	2 1	3 0	1 1
July.....	12 2	5 4	11 0	12 3	5 7	11 0	3 7	1 10	2 9	1 2
August.....	12 0	9 7	8 11	10 0	8 2	12 3	5 2	3 2	3 4	1 5
September.....	12 2	11 7	10 8	11 8	9 6	14 10	6 7	3 1	3 10	1 10
October.....	10 1	12 1	16 3	17 0	5 9	11 0	6 2	2 8	3 1	1 8
November.....	10 9	9 11	16 0	12 9	8 6	—	5 7	2 8	4 0	1 6
December.....	14 2	9 10	17 7	28 0	3 6	—	3 0	1 1	3 11	1 1

(a) Weights of bags vary, but on the average are approximately as follows: For cabbages—Johannesburg, 150 lb.; Cape Town, 105 lb.; and Durban, 90 lb. For cauliflower—Johannesburg, 100 lb.; Cape Town, 65 lb. and Durban, 85 lb.

CONTENTS

	PAGE
REPORT OF THE DEPARTMENT OF AGRICULTURE FOR THE YEAR ENDED 31 AUGUST 1945	131-203
I. INTRODUCTION	131-139
(1) Disturbing Factors	131
(2) Unfavourable Climatic Conditions	133
(3) The Food Position	133
(4) Achievements of our Farmers	134
(5) Agricultural Prices	134
(6) Controlled Distribution	135
(7) Progress in the Livestock Industry	135
(8) The Future Position	136
II. STIMULATING AGRICULTURAL PRODUCTION ...	139-151
(1) Production Work in General—	
(a) Research	139
(b) Extension Activities	140
(c) Co-operative Demonstrations	140
(d) Whole-Farm or Farming-system Demonstrations	140
(e) Agricultural Club Work	140
(f) Home-economics Work	141
(g) Publications	141
(2) Farm Labour	141
(3) Seed	142
(4) Bonemeal and Concentrates	143
(5) Transport	144
(6) Fertilizers	145
(7) Agricultural Implements and Requisites	148
(8) Agricultural Education	150
III. THE MOST IMPORTANT FOOD PRODUCTS ...	151-182
(1) Maize—	
(a) The 1944-45 Season	151
(b) The 1945-46 Season	155
(2) Kaffircorn	158
(3) Wheat	160
(4) Other Winter Cereals—	
(a) Barley	164
(b) Oats	166
(c) Rye	167
(5) Meat—	
(a) Cattle	169
(b) Sheep and Lambs	170
(c) Pigs and Goats	171
(d) Calves	171

FORD'S FOR SEEDS—A. FORD & Co. (Pty.) Ltd.

AGRICULTURAL SEEDSMEN.

SEED CONTRACTORS TO THE UNION GOVERNMENT,

P.O. BOX 5701.

CATALOGUES FREE

JOHANNESBURG.

Lindithgow Library.

CONTENTS (continued).

	PAGE
(6) Dairy Products	171
(7) Margarine	174
(8) Eggs	175
(9) Potatoes	176
(10) Vegetables	176
(11) Groundnuts	177
(12) Citrus Fruit	178
(13) Deciduous Fruit	179
(14) Dried Fruit	180
(15) Wine and Brandy	182
IV. OTHER AGRICULTURAL PRODUCTS	183-186
(1) Wool	183
(2) Mohair	183
(3) Hides and Skins	184
(4) Tobacco	185
(5) Chicory	186
V. CO-OPERATIVE SOCIETIES	186-187
VI. SOIL AND VELD CONSERVATION AND IMPROVE- MENT	187-195
(1) Technical Advice	187
(2) Conservation Areas	188
(3) Pasture Research—	
(a) Veld Control	191
(b) Veld Hay	192
(4) Weed Control—	
(a) Eradication of Prickly Pear	194
(b) Jointed Cactus	195
VII. CONTROL OF AGRICULTURAL PESTS AND STOCK DISEASES	195-203
(1) Insect Pests and Fungous Diseases	196
(2) Locust Destruction—	
(a) The Brown Locust	199
(b) The Red Locust	200
(c) Expenditure	200
(3) Stock Diseases—	
(a) Lumpy-skin Disease	201
(b) Newcastle Disease	201
(c) Foot and Mouth Disease	201
(d) Nagana	201
(e) East Coast Fever	202
(f) Anthrax	202
(g) Lambsiekte	202
(h) Contagious Abortion	202
(i) Scab	202
(j) Vaccines	202
(k) The Blue Tick	203
(l) Research	203
(m) Committee of Investigation	203

[Photo on Cover: Fruit Research Station, Stellenbosch.]

[NOTE.—Articles from *Farming in South Africa* may be published provided acknowledgment of source is given.]

Agriculture at the End of the War.

Report of the Department of Agriculture for the year ended 31 August, 1945.

Dr. C. H. Neveling, Secretary for Agriculture.

THE close of the report year coincided with the conclusion of the most widespread and devastating war the world has ever known. Fortunately for the population of South Africa, in all the six years of this sanguinary conflict, war was never waged actively on home soil and we escaped the colossal destruction of civilian lives, the incalculable loss of productive material, the devastation of buildings, etc. All these horrors were spared us. Nevertheless, our people, no less than any of the other belligerent nations, breathed a sigh of relief when peace was announced.

This report year still falls within the term of office of my predecessor, Dr. P. R. Viljoen, to whom I should like to pay tribute for the signal services rendered by him to agriculture in the twelve years during which he was the permanent Head of this Department.

At present we are standing at a very important point in the history of mankind; the six long years of bloodshed and destruction are over, and the world has reverted to the ways of peace. For six years everything was concentrated on the war; people could think of nothing else, industry and labour were directed into channels of war production and agriculture had to be adapted to serve this one end. Fortunately, in time of war as in time of peace, human beings must eat, and food production was, therefore, just as important as the production of armaments. Actually, it was only during these war years that the world began to realize how important food is and where it comes from. Foods which formerly appeared on the table as a matter of course, could be obtained during the war years only by dint of trouble and effort and sometimes had to be foregone.

The world became food conscious and, consequently agriculture conscious.—Agriculture gained recognition of its rightful place in the national economy, an end striven after by farmers the world over, and interest in the soil was stimulated to an unprecedented extent.

Disturbing Factors.

Six years of war cannot go by, however, without leaving a deep imprint on every belligerent country, no matter how far removed from the actual battle front. We, in South Africa, therefore also inevitably had to feel the effects of the conflict overseas—effects which have penetrated deep into our national life especially in the social and economic spheres.

In *social spheres* it has stirred up, in many sections of our population, a spirit of restlessness which engenders misconceptions and instability and is in no way conducive to post-war readjustment and

security. This spirit is always in evidence after a war, and it creates one of the most difficult problems, viz., that of leading a nation back to normality. Even before the end of the war, the importance of this question was realized by the authorities, who have taken every possible measure to deal with the problem. This difficult task is being actively prosecuted. Owing to the more peaceful nature of country life, however, this sense of instability is not likely to be so marked among the farming community. In fact, agriculture should make an important contribution during the post-war years towards the creation of a more calming influence and the right perspective in the nation as a whole.

In the *economic sphere* the effect of the war was of a twofold nature; good and bad. Our farmers undoubtedly experienced difficult years. Although agriculture was regarded as an essential industry, also in time of war, and, therefore, one which demanded special treatment, unavoidable war conditions compelled our farmers to bear the handicap of a *shortage of many essential requirements of production*; fertilizer supplies were inadequate, agricultural implements were scarce and often unobtainable, supplies of protein feed were limited and, following the withdrawal of manpower for war purposes, the farm labour problem gradually grew worse. Much was done by the state to cope with these difficulties, but it stands to reason that such obstructive factors inevitably had to leave their mark on agriculture. Perhaps even more important than these restrictions was the fact that, owing to the lack of shipping space, farmers had to be urged to produce more cereals, more wheat and maize, in order to enable our local production, supplemented by imports, to supply at least the basic foods of the population, viz., bread and mealie-meal porridge.

These two factors had the effect of forcing the development of agriculture in an undesirable direction. A stronger way of expressing this would be to state that the war has seriously retarded the *process of bringing our agricultural production on a sound basis*. Instead of breaking away from the monoculture of maize and wheat, and adapting farming systems to natural conditions and the conservation of soil fertility, our farmers were, in the interests of food production, compelled to continue with these malpractices and, owing to the shortage of fertilizers, to impoverish and exhaust the soil still further. The Department of Agriculture was a party to this procedure since it was from time to time virtually forced by circumstances to appeal to farmers to produce and to produce still more. We all knew that, from the agricultural point of view, this was wrong, but there was no alternative. Thus, when some of our city friends, as they so often do, criticise farming for being inefficient and exploitative, it would be well to remind them that, but for the fact that we had to provide food for the population, the end of the war would have found us much further advanced on the road of agricultural reorganization and improvement of farming practices.

The fact must also be stressed that farmers had to undertake this tremendous task of increasing the food supply—created mainly by the requirements of the forces, the presence in the Union of a large number of evacuees, the necessity of supplying provisions for numerous convoys, and the increased purchasing power of the population in general—during a period when importation was greatly restricted, not only through lack of shipping facilities, but also because food-stuffs were becoming increasingly scarce and expensive in other surplus-producing countries of the world.

Unfavourable Climatic Conditions.

This task of our farmers was complicated still further, especially from 1942 onwards, by unfavourable climatic conditions, chiefly droughts and floods. Before 1942 the food position in South Africa gave no serious cause for alarm. Towards the end of that year, however, and within the space of a few months, the situation underwent a sudden change. On the one hand there was the sudden increase in demand, and on the other, the decrease in production caused by a serious drought, with the result that the problem of surpluses disappeared and was replaced by its opposite, viz., that of increasing our food production to meet the greatly increased requirements of the nation. It is no exaggeration to state that of all the detrimental influences of the war itself, no single factor had such a hampering effect on agricultural production as the afflictions imposed by nature. Farming in this country is subject to the periodic ravages of nature, but the past few years have been exceptional in this respect and have taxed the farmers' powers of endurance to the utmost.

Maize, the most important staple product of the country, presents an example of what happened to a great many other products. Owing to a serious drought, the 1941-42 maize crop amounted to only about 16,000,000 bags. Up to the end of January, 1943, favourable climatic conditions encouraged the expectation of a record crop of 30,000,000 bags during the next season, but a renewed drought, which commenced in February, resulted in a loss of 7,000,000 bags of maize. Between 1939 and 1943 an additional area of 200,000 morgen was put to maize, but drought kept the 1943-44 crop below 20,000,000 bags. A crisis was reached when, as a result of another severe drought, a comparatively small crop was once again obtained during 1944-45, in spite of the fact that a further 200,000 morgen had been planted to maize. The cumulative effect of all these droughts has placed the country in a very serious position as far as maize is concerned.

The Food Position.

As regards the food position in general, there is no denying the fact that the past year was the most difficult of the war. With a serious shortage of maize, wheat and kaffir corn, a potato crop which was, generally speaking, of inferior quality, and a decrease in dairy production as a result of the drought, the total food supply fell to a comparatively low level. In order to supplement the shortage, efforts were concentrated on importation, especially of maize and wheat. In the case of wheat, a considerable measure of relief was obtained, and sufficient wheat was imported to tide the country over on the basis of the standard loaf, until the new crop becomes available. The position in regard to the importation of maize was much more difficult. Limited supplies were obtained from Kenya and a few other states in Southern Africa, but the main difficulty arose through a failure of the Argentine's 1945 crop. Due to the drought, the kaffir corn and ground-nut crops are very small, and, in addition, importation presents serious difficulties. Fortunately, the position in regard to eggs and meat has improved considerably.

In the circumstances it is understandable that, in the case of certain products rationing had to be continued on a stricter basis than last year. Criticism was not lacking, but the thinking section of the population realized that we are faced with an accomplished fact and that we have to adapt ourselves accordingly. Moreover, all things considered, the Union is still in an exceptionally favourable position in comparison with the other countries which participated

in the war, in spite of the heavy wartime demands on our food supply, and the obligations to our allies, which had to be met.

Achievements of Our Farmers.

There are still further obstacles which complicated the farmers' task of production, and consequently his achievements are even more impressive. One fact cannot be disputed: Our farmers have acquitted themselves most creditably of their task and are contributing their full share towards supplying the country's food requirements. No one can challenge the following words in Dr. Viljoen's farewell message to the farmers of South Africa:—

"Your perseverance and *will* to triumph over all obstacles have proved once again that you, as a community, are fully alive to the significance of the rôle which you play in the national economy, and that the nation can rely upon you to carry out effectively your important functions. I depart from South Africa deeply impressed by the unswerving determination of the South African farmer, and assured that those who are dependent for their livelihood upon our most important industry, will cover themselves with credit and honour in the devoted performance of their momentous task".

An objective review of the farmers' position as a whole, against the background of the stupendous events of the war, forces us to the conclusion that our agriculture has passed through this period of disruption without suffering irreparable damage. In fact, it can be said that *our agriculture*, on emerging from these war years, does not find itself in too unfavourable a position. This is due mainly to steps taken by the Government in regard to production, the price policy of the country, and to the control of distribution.

Agricultural Prices.

Reasonable prices for the farmer constituted the most important measure employed to encourage production. The price policy followed in this respect was consistently aimed at ensuring a reasonable price to the farmer. The fact was fully appreciated that the war has revised the costs of the entire production process for the farmer. In a determined attempt to maintain and increase production, a policy was adopted which was calculated to ensure a reasonable price to the farmer in the circumstances prevailing at a given time. Consequently, it can unhesitatingly be said that in the case of practically every product the price increases allowed were such that they not only covered the production costs and the cost of living of the producers, but also assured the farmer and his family of a reasonable livelihood. The fact that so many farmers reduced or completely wiped out their debts, is further proof that the compensation received by producers for their special efforts was adequate and enabled them to maintain their position under the existing abnormal conditions.

Admittedly, the level at which prices were fixed for most agricultural products was not popular. Many producers complained that it was too low and many consumers that it was too high, whilst the trade resented the institution of control. It can only be emphasized that everyone was treated according to the same standards of justice and equity. The consensus of opinion was, and still is, that the prices of agricultural products could not be left to soar uncontrolled. This would have led to serious *inflation*, which, with its destructive cyclical effects, ultimately undermines the whole economic life of the country,

and very detrimentally affects agriculture itself.* In fact, the whole community knows from experience the meaning of post-war inflation, followed by depression.

Inflation cannot be completely avoided during the war years, but such inflation as exists at present, it still under control. If it does not develop much further, there need be no fear of a serious depression and the world price level could be brought down by degrees, with the object of achieving stability at a point, above the pre-war price level, considered by the major powers as suitable with due regard to the world economic position. Since the beginning of the war the United Nations have made strenuous and very successful efforts at keeping prices under control. Let us now refrain from doing anything which will promote further inflation; let us keep the foundations of agriculture firm for the future.

Controlled Distribution.

The Food Control Organization and the control boards have also been responsible for progress in the sphere of distribution during the war years. This function, which met with a storm of criticism, is handicapped by numerous flaws, especially in so far as the distribution of perishable products is concerned. The Food Control Organization does not come within the purview of this report, but a few remarks on the rôle of the control boards and the *control board system* would not be inappropriate.

This system was introduced for the first time at the beginning of the war, during the course of which it was crucially tested in practice. The manner in which the control boards acquitted themselves of their task, redounds to their credit. Had it not been for these boards, the provision of food would have been accompanied by very many more difficulties than was actually the case. The boards were subjected to severe criticism from farmers, dealers and consumers alike. Many of these critics were uninformed and sometimes prejudiced. Moreover, most of the criticism was inspired by the *rationing* of supplies which the boards had to carry out on behalf of the State, in the absence of a national system of food rationing which was impracticable in this country with its mixed population. Rationing is not one of the normal functions of the boards, but it was unavoidable in view of the precarious supply position, and at the request of the authorities it was assigned to the boards. Consequently, the latter had to bear the brunt of the criticism. Notwithstanding this criticism, however, the control board system established itself during the war years and justified its continued existence. This constitutes progress of great importance.

Progress in the Livestock Industry.

In spite of the obstacles put in the way of agricultural production by the war and unfavourable climatic factors, some progress was nevertheless made in this field. The *dairy industry* expanded—an event of importance, since dairying is one of the branches of farming which, in view of its ready adaptability to a sound system of farming, is regarded as an industry in which there is ample scope for development in this country. *Pig farming* and poultry farming also expanded. This development of animal production is strikingly reflected in the greatly increased consumption of *concentrates*. If there had been adequate supplies of protein feed, this increase in consumption would probably have been even greater.

Generally speaking, our farmers may therefore be said to have become feed conscious. This term implies recognition of the need

for better animals, increased yields and more efficient production. Fortunately this consciousness also extends to the soil and recognizes its importance as the only national asset which, with proper treatment, can continue producing for century upon century.

A development of the greatest importance concerns the *post-war marketing of wool*. Wool is our premier export product and in establishing this industry on a sound basis for a number of years, we have provided for the future of many stock farmers. Arising from the Wool Conference which was held in London a few months ago, some far reaching decisions were made in connection with a question which is of the utmost importance to South Africa. The new wool scheme offers security to our numerous wool farmers and long-term assurance for the development of one of our most important livestock industries. Legislation embodying the terms of the scheme will be introduced at the next session of Parliament.

To recapitulate: We have emerged from the war with an increased production potential; with more severely impoverished soil, but alive to the national importance of that soil; with a tried control board system; with agricultural prices which have been kept within reasonable limits. Our general position can be regarded as sound, and we are therefore reasonably well-equipped to face the future.

The Future Position.

There is still, of course, the future, which, in a dynamic industry like agriculture, is of greater importance than the past. Agriculture must advance to the fulfilment of its important threefold task, supplying food for the nation, assuring a reasonable livelihood for those who must live on the land, and making a greater contribution to the national income.

To begin with, there is the *immediate future*. The war is over, but its detrimental effects will not disappear overnight. As far as the instruments of production are concerned, fertilizers, for instance, will not immediately become available in sufficient quantities; supplies of agricultural implements will not be adequate until the factories have made up the leeway; and in respect of protein feeds there is an acute world shortage. The transport position remains difficult and there are not enough rail and road motor vehicles for transporting either the instruments of production or the products with the necessary speed. We may hope for a gradual improvement but, in the coming year agricultural production will, to a large extent, have to continue on the war-time basis.

In regard to agricultural products, we must once again urge our farmers not to slacken their efforts at grain production but to increase their production of both wheat and maize. The serious consequences of the drought for the maize crop and the detrimental effect on the winter cereal crop of excessive rains and drought, have placed this country in an unenviable position, and to make matters worse, large areas of the country, especially the Eastern Cape Province and the Northern Transvaal, are in the throes of an unprecedented drought. We are facing a difficult year and if the summer rains do not come in time, conditions may deteriorate in a very serious degree.

It is chiefly due to the poor maize crop that we find ourselves in this position. Because maize is an essential item in the diet of natives and in animal feed, it occupies a key position in this country. A shortage of maize is felt not only by all groups of consumers as a shortage of an article of diet, but also by all branches of livestock farming which depend on animal feeding for their success.

If we do not have good summer rains it is clear that the coming months are going to be critical. Every farmer must make provision as best he can. It may even become necessary to curtail still further the restricted quantity of maize allowed for animal food at present. Furthermore, there is very little other feed and relief cannot be expected before the lucerne and barley crops mature. It is not necessary to enlarge on the effect of this critical state of affairs on our livestock industries. It is a handicap to improvement as well as production. Nevertheless, this is only a temporary phase, and few countries are the equal of South Africa in its powers of rapid recovery, when natural conditions become favourable again.

Importation is receiving every encouragement, but considerable difficulty is being experienced. *Local production*, by far the most important source on which we have to rely, is *still being stimulated*. In the case of maize for instance, a special campaign has been launched with a view to having maize available as early as possible next year. An additional 25,000 tons of fertilizer will be allocated to the principal maize-producing districts. In addition the Prime Minister has announced in advance that the price of maize will be 19s. per bag (for the best grades) during the coming season, irrespective of the size of the crop. These two measures should prove to be a strong incentive to farmers to speed up and increase their maize production.

A fact to be stressed is that it is not in the interest of agriculture to discontinue all temporary *war-time control of prices and commodities* at this stage, since such a step may nullify all the sacrifices which farmers, in order to check inflation, were called upon to make in submitting to price control. There is no doubt that as long as commodities remain scarce (and this will be the case until the factories of the world reach a satisfactory level of production and shipping difficulties are solved) the sudden complete removal of control will lead to inflation. The policy adopted is to relax control by degrees as circumstances justify it, but our farmers should not make themselves guilty of clamouring for the abolition of control merely because many hold the view that the entire community should be allowed to buy what it pleases.

In this connection consider also the *price of land*, which has already experienced a considerable rise. Repeated reference has been made to the risk involved in buying land at figures out of proportion to the normal prices of the products obtained from it. The heavy capital investment often results in the ultimate financial ruin of the farmer.

As far as the *long-term position* is concerned, we are entering upon a new period—a *period of agricultural reconstruction*. Owing to delays in the publication of the comments of the Planning Council on the reconstruction report, final consideration of this matter by the Government was also delayed, but it is hoped that a decision will be reached in the near future, followed by a statement of policy in this connection.

Naturally there will be differences in opinion on such an important matter as the future of agriculture, and it is therefore understandable that the Reconstruction Report and the report of the Planning Council (Which has now been published) should not be in agreement on all points. Fortunately, however, there were few points of fundamental difference. These points of difference have been investigated by a Joint Committee and the report of the latter will shortly be examined by the Government.

It must be emphasized, however, that as has been indicated in the *Reconstruction Report* the future long-term policy for the agricultural industry should be based mainly on two fundamental points, viz. (1) a sound policy for the conservation of our natural resources—soil, veld, water and stock; and (2) a sound economic and marketing policy.

The second point virtually amounts to ensuring reasonable prices for farmers and consumers. The importance of agriculture in our national economy is generally recognized and stability in the field of economics and marketing should be one of her main goals. Agriculture can fulfil its task of supplying the country with food and raw materials, increasing its contribution to the national income and at the same time yielding a net return which will ensure a reasonable income for our rural population, only if prices remain at a reasonable level and productivity and efficiency are increased.

This links up with the second point. Both bodies approached this aspect of reconstruction from the same angle and no particular differences on the point are contained in their reports. What is actually needed is *better adaptation of our agriculture to the natural conditions of the country, and the establishment of the most suitable systems of farming, with the accent on soil conservation and soil fertility.*

Notwithstanding war conditions considerable progress has already been made in the direction of soil and veld conservation and the improvement of farming systems. The groundwork has already been done by *reorganizing the divisions concerned.* From the 1st of September the Divisions of Animal and Crop Production and of Soil and Veld Conservation will be known as the Division of Education and Research and the Division of Soil Conservation and Extension, respectively. The necessary transfer of personnel is already being carried out and the staffs of both Divisions are being considerably strengthened, mainly with a view to more effective concentration on the questions of soil conservation and improved farming systems.

By this arrangement Departmental forces will undoubtedly be more effectively mobilized and co-ordinated for research, training and field work, which should, in the final instance, form the basis on which the problem is to be tackled in its entirety. As far as research is concerned, it may be mentioned that pursuant to the recommendations of the *Reconstruction Report* regarding additional experiment stations, a *Departmental Committee* has been appointed to investigate the question of *establishing additional experiment stations.* Numerous requests for more stations have been received, but it is obviously impossible to comply with all of them. A system of selection based on the requirements of various parts of the country must therefore be adopted.

In addition, progress has also been made with research on stock diseases, and this is of the utmost importance in view of the place occupied by our livestock industries here in the Union. A strong *committee* was appointed a few months ago to investigate amongst other things, certain matters concerning *the improvement of our veterinary services*, including staff requirements and the necessary facilities for research and field work. The report of the Committee is nearing completion.

It is true that diseases like foot and mouth disease and lumpy skin disease made their appearance in a few areas, but on the other hand, perceptible progress was made in the veterinary sphere with the

testing of new remedies such as D.D.T., and the "Lamsiekte" vaccine.

It is also expected that the *Cattle Improvement Scheme* will be actively prosecuted in the near future by once again applying the penalty provisions of the Livestock and Meat Industries Act (No. 48 of 1934).

This will mean that it will again be possible to institute legal proceedings for contraventions of the Act. Although the scheme will be applied sympathetically at the start, it will mean that we will gradually be able to replace all unsuitable bulls and in this way build up our herds to a high standard of utility and efficiency.

The *re-opening of the colleges of agriculture* is another measure which will contribute considerably to the reconstruction of agriculture. Initially it is proposed to utilize the colleges mainly for providing courses for ex-volunteers, with a view to enabling them to supervise work proposed in connection with positive schemes for soil conservation and improved farming. On the completion of these courses, the colleges of agriculture will, under the reorganization scheme, concentrate chiefly on research and training, both of which are of the greatest importance for the future of agriculture.

Since it has become apparent that the biological control of the prickly pear is not a complete success, it has been decided to reintroduce mechanical eradication of the plant as an additional measure. This work is being subsidized on a liberal scale by the State and has already developed beyond the experimental stage. It is hoped by this measure to reclaim thousands of morgen of land for agriculture and grazing purposes.

By degrees we are therefore carrying into effect certain recommendations contained in the Reconstruction Report. As soon as it is possible for the Government to make a general statement of policy, the rate of the reconstruction work will have to be increased considerably. The State will have to provide additional funds, and the direct or indirect assistance and co-operation of every member of the community—but especially of farmers and organized agriculture—will be essential for the practical execution of this gigantic task.

II. Stimulating Agricultural Production.

REFERENCE has already been made to the hampering effect exercised on agricultural production during the war by the shortage of certain instruments of production, and to the steps taken by the State in this connection. It is now necessary to follow up the general discussion in more detail, particularly in view of the frequent allegations that one of the principal reasons for the difficult food position is the absence of a departmental production programme.

Apart from factors beyond our control, such as unfavourable climatic conditions and the fact that only a small percentage of South Africa's soil is suitable for crop production, there are numerous other points calling for further elucidation.

Production Work in General.

Research.—In the final instance, research work must inevitably constitute the basis of progress in the field of agriculture, and this work was continued throughout the war years, albeit on a reduced

scale, owing to the absence on military duty of a large number of officers. From time to time, however, satisfactory results were obtained, from which production benefited appreciably. Agricultural research will play a bigger rôle in future than ever before in the history of this country. It will be one of the main pillars of agricultural reconstruction.

Extension Activities.—The thirst for reliable information on the part of farmers is evidenced by the fact that during this report year thousands of requests were once again received for the services of extension officers. From the earliest days of the war the Department realized that one of its principal tasks would be to furnish guidance with a view to stimulating production in specific directions. Consequently, the Department sent out as many of its officers as possible amongst the farmers to instruct them as to how they could increase their production of certain essential crops.

Here, too, a shortage of personnel constituted a limiting factor. The Department is continually receiving representations from farmers' and other organizations to make more extension officers available to them and to reduce the areas served by each officer, but thus far it has not been possible to give practical effect to these representations. In view of the reorganization, it is hoped shortly to make a commencement with the reinforcement of this service on a more effective basis.

The general information furnished was, and still is, aimed mainly at the stimulation of food production for man and beast (with due regard to the conservation and building up of the soil and soil fertility, as far as possible), stock improvement, improved pasture control, the production of fodder crops, especially lucerne and legumes, the establishment of pastures, and the production of staple feeds such as wheat and maize. Farmers are also furnished with advice in regard to the best way of utilizing such instruments of production as are in short supply, like fertilizer, agricultural implements, etc.

The manufacture of municipal and farm compost and its utilization for enhancing the fertility of the soil and stimulating production also aroused much interest.

Co-operative Demonstrations.—This form of guidance to farmers continues to be one of the best means of promoting improved farming practices. Attention was concentrated mainly on feed production, soil fertility and erosion control.

A striking feature is the popularity among farmers in various parts of the country, of hairy vetches and certain varieties of *Setaria* grass imported from East Africa a few years ago. These crops will probably play an important rôle in the production of feeds and grazing in areas with a relatively high summer rainfall.

Whole-farm or farming-system demonstrations are of special importance. The first six of these large-scale demonstrations are making progress and already they are influencing the farming systems in their neighbourhood. Four new demonstrations have been put into operation. We trust that it will be possible for these demonstrations, which are a potent instrument in our efforts at improving farming practices, to be systematically extended. It is proposed to add several new demonstrations during the course of the next few years.

Agricultural Club Work.—The value of this section of the Department's enlightenment work has once again been demonstrated

by the growth and expansion of this movement, the signal successes achieved in certain spheres, the enthusiastic support and the interest aroused. To-day the movement is very popular, furnishing as it does, practical guidance in regard to various subjects relating to farming and housekeeping. Many of the older clubs have already had such a profound influence on their own communities that improved farming methods are being practised all round.

Interest in *National Service* is gradually increasing. Several successful national-service camps have been held in each of the four provinces, and the valuable work carried out in connection with erosion control, tree planting, the construction of dams, etc., is a promising indirect contribution towards the maintenance of production. Indeed in these times of soil depletion, any service rendered to arrest the process of exhaustion conduces to the advantage of farming. The movement is still largely in the first phase of its evolution, but its national value for the future has already been proved.

Home-Economics Work.—The Home Economics Officers of the Department played a prominent rôle during the war. To them fell the task not only of continuing with their demonstration work and giving lectures for the benefit of women's organizations, which at times necessitated the covering of large distances by motor in order to reach remote places, but also of devoting their energies to the preparation of food, with a view to evolving new dishes calculated to ensure a balanced diet, in spite of the shortage of certain products. Through the medium of lectures, demonstrations, broadcast talks and numerous articles published in the Department's Publicity Series, these officers made a valuable contribution towards food conservation.

Publications.—In conjunction with the numerous other measures instituted with a view to keeping the farmer abreast of correct production methods, etc., publications and broadcast talks were continued. Their main trend was the instruction of farmers as to the numerous measures which can be instituted in order to maintain and increase production. *Farming in South Africa* continued to be the mouthpiece of the Department in this connection, and it was vigorously supported by the regular Press Service and Publicity Series.

Farm Labour.

Even prior to the outbreak of the war, the question of farm labour gave rise to considerable difficulties, owing to the fact that the industries, and city life in general, attracted increasingly large numbers of natives to the cities and towns. The shortage was aggravated by the heavy enlistment in the forces of natives and coloureds.

Fortunately, it was possible to alleviate this position to a considerable extent by making prisoners of war available to farmers. In most cases these prisoners of war were of great assistance. A few months ago, however, the Department of Defence withdrew the prisoners of war from camps which had been established in various parts of the country and from which the labour had been drawn.

In the meantime, however, more natives and coloureds have been discharged from the army, and it is expected that increasing numbers of native and coloured ex-soldiers will return to the farms. This will assist in augmenting the present number of farm labourers.

The whole problem remains a difficult one, however, and the time is ripe for it to be tackled in its entirety. The Executive of the South

African Agricultural Union is at present negotiating with the Department of Native Affairs with a view to finding a more permanent solution.

A housing scheme for farm labour has been approved in principle and will be put into operation as soon as possible by the National Housing and Planning Commission in consultation with the Department. The scheme envisages the payment of bonuses in respect of houses erected for European and Coloured farm labourers and should make a considerable contribution towards the improvement of the living conditions of farm labourers and the stabilization of available farm labour.

Seed.

Seed production is an important means of stimulating production, and the following facts in regard to the year's work are of interest:—

Work on the breeding of *maize*, *kaffircorn*, *soybeans* and other summer crops, as well as the development of high-quality blight-resistant *wheat varieties* constitutes an important part of the work carried out at the Potchefstroom College of Agriculture. Good progress is being made. The seed-experiment station established at this institution some time ago, continues to expand. Seed dealers and farmers are making full use of the facilities offered and the former willingly co-operate in so far as the correct naming and description of seeds proclaimed under the Act is concerned. During the year seeds of various *grass species* were brought within the purview of the Act. This will undoubtedly lead to the production of improved grass seed. Tests on selected *teff grass* also gave good results and promoted higher yields.

During the past year the Hartebeespoort Experiment Station produced 27,000 ounces of selected *Virginia tobacco seed* for sale to *bona fide* tobacco-growers. This quantity, together with smaller quantities produced at Nelspruit and Oudtshoorn, will, for the greater part, meet the requirements of the Union's *Virginia-tobacco* growers. In so far as *Turkish tobacco* seed is concerned, the Stellenbosch-Elsenburg College of Agriculture once again devoted much time and attention to the breeding of good and reliable seed for sale to growers. The demand was exceptionally heavy this year and about 1850 ounces were disposed of. More than 90 per cent. of the tobacco-growers placed their orders for seed with the College.

A few outstanding new strains of *yellow maize* were developed at the summer-crop Experiment Station at Kroonstad and have been tested out with very good results, by farmers in the north-western Free State. The Stellenbosch-Elsenburg College of Agriculture scored further successes with the numerous wheat and winter-cereal variety experiments which have been in progress for some years with a view to the development of superior species, more particularly those suited to the soil and climatic requirements of the western Cape Province.

Of special significance is the development of the *vegetable-seed industry* during the war years. Before the war vegetable seed was mainly imported from certain European countries at a considerably lower cost than that at which it was possible to produce the seed, in South Africa. Very soon after the outbreak of the war, the Union's sources of oversea imports were cut off, and the Department instituted its own production scheme. Serious difficulties had to be surmounted. Chief among these was that of enlightening farmers on the production of seed of good quality. This task was undertaken by the Division

of Horticulture, and thanks to its activities, seed production has progressed by leaps and bounds. In 1943 seed dealers established an association, and a year later vegetable-seed growers followed suit. The Department inaugurated a seed-inspection scheme and undertook control over imports and exports. The result of these measures is that the quality of some locally-produced seed is as high as that of the imported article and that prices, too, compare quite favourably.

There are at present some 340 registered vegetable-seed growers in the Union falling under the inspection service. The vegetable-seed scheme was an appreciable factor in the prevention of a vegetable shortage in this country. Indeed, it made possible production on a scale large enough to have a stimulating effect on the output of the canning and dehydration factories.

There is yet another feature of vegetable-seed growing worthy of mention, *viz.*, the elaborate tests carried out during the past few years by the Vegetable Experiment Station on the Cape Flats. Experiments are carried out on practically all species of importance to that area, and the results obtained have already made a valuable contribution towards the solution of the fundamental problems of the vegetable industry.

In view of the susceptibility of South African *seed potatoes* to virus diseases, fresh supplies are constantly being imported, particularly from Scotland. The imported tubers are propagated locally up to the third or fourth generation, and the seed potatoes so obtained are then utilized for the cultivation of the principal crop.

Shortly after the outbreak of the war, a serious shortage of seed potatoes arose, and it became necessary for the Department to take the necessary steps for ensuring an adequate supply of seed potatoes to maintain production.

The problem was tackled from three angles. In the first place, research work was extended with a view to encouraging the cultivation of virus-free potatoes. Very good results were obtained, and a Potato Experiment Station is now being established at the Riet River Settlement.

Secondly, the Departmental services in connection with the inspection and certification of seed potatoes were also extended through the organization of greater numbers of seed-potato associations in all areas regarded as suitable for the cultivation of seed potatoes. In 1941 there were 3 such associations. To-day there are no less than 36.

Thirdly, owing to the risk of degeneration in transit and storage, the Department itself undertook the importation and distribution of seed potatoes from the United Kingdom. Importers were also allowed to undertake independent importation from the United States of America and Canada, provided they were prepared to bear the attendant risks themselves. The importation scheme was carried out without a hitch. A considerable quantity of seed potatoes has once again been ordered from the United Kingdom for the coming season.

Bonemeal and Concentrates.

Bonemeal is an essential requirement in the maintenance of production, particularly of milk, dairy products and meat. Its value lies in its high phosphorous content, a mineral in which most of the Union's soils are deficient. The feeding of bonemeal is also indispensable as a protective measure against gallamsiekte.

Since the outbreak of the war, considerable difficulty has been experienced in regard to the provision of the country's bonemeal

requirements. Our dependence upon imports and the restricted importation facilities arising from the shortage of shipping space, in conjunction with the high prices of the imported article, had a hampering effect on the livestock industries.

Strenuous efforts were directed at stimulating local production. The measures instituted include the raising of the price of bones to 7s. per 100 lb., propaganda through the medium of a whole series of organizations, etc. Unfortunately, no noteworthy progress was made in this field and this year's production remained at more or less the same level as last year's *viz.*, approximately 20,000 tons. The demand on the other hand, is considerably higher than the pre-war demand of 30,000 tons. Hence the supply position is not too favourable, particularly in view of the fact that the Department is eager to make more bonemeal available in order to strengthen our livestock industries. For the past few years, it has been possible to set aside only a small percentage for this purpose, since gallamsiekte areas must enjoy preference, and require large supplies.

The system of distribution on a ration basis against permits, proved satisfactory, but permits can be issued only within the limits of the available stocks, and unfortunately it was not possible to satisfy all applicants. It is therefore necessary once again to emphasize that under the present conditions of short supplies and high demands, the Department cannot depart from the policy of giving preference to gallamsiekte areas, where the bonemeal is most needed. Nor can there be any question at this stage of abolishing the prohibition on the use of bonemeal as a fertilizer. During the year, 8,500 permits for bonemeal were issued to farmers every quarter.

The quantity of stock lick which can be manufactured is limited by the fixed quantity of bonemeal allotted for that purpose, and this allotment cannot be increased as long as the bonemeal shortage persists. Stock licks are also valuable animal feeds, and are made available mainly in parts where it is not possible to furnish bonemeal. During the year, approximately 3,000 tons of stock lick were manufactured, and issued against permits.

In January the prices of both bonemeal and stock licks were revised. In the case of bonemeal they vary from 13s. 6d. to 14s. per 100 lb., and in the case of stock lick, from 12s. 3d. to 16s. 6d., depending on the various types and quality.

Carcase Meal (meat and bonemeal) is also rationed and issued against permits, mainly in the case of poultry and pig mixtures. A fixed quota is allowed to feed mixers, but in order to meet the demand it will be necessary to import considerable quantities of bone at high prices.

An important development in regard to the feeding of livestock, especially in the case of dairy herds and poultry, is the increasing demand for balanced rations of *protein-rich feeds*. Under normal conditions, adequate supplies of cereals for this purpose are produced locally, but there is a shortage of proteins, and the local production of cake meal is inadequate to meet the demands of farmers wishing to make their own balanced ratios, and also of feed mixtures.

The whole position regarding the production, supplies and distribution of stock feed is at present being investigated by a departmental committee.

Transport.

The curtailment of transport facilities also complicated matters for the farmer. Private vehicles were practically unobtainable; nor

was it easy to obtain sufficient trucks for the greatly-increased transportation of products and production material.

In co-operation with the Railway Administration and the Department of Defence, however, lorries were made available for the transport of certain important crops, such as maize, and also for kraal manure which increased in importance as a fertilizer in consequence of the fertilizer shortage. Towards the end of the past maize-threshing season, however, the Department of Defence was compelled to withdraw its lorries, but the Railway Administration continued to assist farmers as far as possible in this important work.

It stands to reason that the position in regard to railway trucks did not improve as the war raged on, but it is most gratifying to be able to state that the Railway Administration was always ready to assist and was extremely obliging in so far as the transport of products and farming requisites was concerned. True, there were delays, but these were invariably due to insuperable difficulties.

Fertilizers.

The demand for *fertilizer* continues to exceed the supply. During the war our fertilizer manufacturers increased the production of super-phosphate, through factory expansion, to a maximum which compares very favourably with our normal pre-war consumption. Owing to the heavy demand for farm products, coupled with better prices, the fertilizer requirements of farmers have trebled themselves since the outbreak of the war, but only about one-third of the demand can be satisfied.

The normal fertilizer allocations for 1945 were originally, in November 1944, based on the maximum factory production during the whole of 1945. After the permits for the first half of 1945 had already been issued, unexpected difficulties arose in connection with the importation of Moroccan rock phosphate with the result that by the end of April our supplies of superphosphate fell short by about 30,000 tons. Unfortunately, it therefore became imperative to cut down all allocations for the second half of 1945 by one-third. Maize and potato farmers were hardest hit by this reduction.

In view of the difficult maize position, most maize farmers were subsequently compensated, when it was decided, as a special measure, to make available an additional 25,000 tons of fertilizer for the sole purpose of assisting maize farmers in the recognized high-producing maize districts in increasing and speeding up their production for 1945-46. It will be appreciated that it would have been unpractical to distribute the small quantities of available fertilizer among all maize farmers in the Union. The distribution had of necessity to be confined to districts in the recognized intensive maize belt.

The estimates for 1946 are again based on maximum production; thus each farmer can expect more or less the same as in 1945, plus the one-third cut.

Since our factories have already reached their maximum production of superphosphate, we cannot rely on any appreciable increase in the local production for improving the 1946 position, even if we were to succeed in importing larger quantities of rock phosphate from overseas. If the latter course is possible, however, the factories will be able to effect a slight increase in their output of superphosphate mixture.

Higher fertilizer allotments in 1946 will therefore be possible only if we succeed in importing appreciable quantities of processed

phosphate in the form of superphosphate, double superphosphate or ammonium phosphate. Owing to the big demand in Europe and other countries, prospects in this connection are not too bright although the Government continues to make every possible effort in this direction.

Although the war is over and the shipping position may improve appreciably, the demand for phosphates will probably continue to exceed the available supplies for some considerable time, and at least for 1946. As long as this position persists, it will definitely not be in the interests of our farmers to relax the control over fertilizer. The scheme has been, and, in fact, is still one of the principal production schemes of the past few years.

Moreover, rationing has been placed on a more effective basis during the past year and distribution is being carried out according to a priority rating, particularly in so far as essential foodstuffs are concerned.

The estimated supplies for each calendar year are allocated as early as the beginning of November of the preceding year, and permits are issued immediately. The 1944 and 1945 application forms are being used again for 1946. Farmers who have already received fertilizer permits this year will therefore not be required to submit fresh application forms. All farmers who did not obtain any fertilizer this year, must send in the requisite application form before 31 October, 1945, giving very sound reasons as to why this is their first application. Persons who have bought or leased farms must furnish the Controller of Fertilizer with full particulars in regard to any such changes before the aforementioned date. Late applicants and persons failing to give timely notice of changes of address, will not be taken into consideration before July 1946.

Late applications annually give rise to untold confusion and dissatisfaction, and it is imperative that this hampering factor should be eliminated in the interests of the rationing scheme and of the farming community as a whole.

By this time a fertilizer quota will have been allocated to practically every farm in the Union. Since the fertilizer position remains more or less constant, no fertilizer can be granted for expansion of farming. Farmers purchasing or renting new farms, should therefore, before negotiating such transactions or purchasing expensive seed and tractors, ascertain whether they will receive an allotment for that farm and what their chances are of securing fertilizer. In exchanging or sub-dividing farms, farmers must make their own arrangements in regard to the distribution of the fertilizer quota. The new owner or lessee is entitled to the fertilizer allotted to the farm.

Considerable dissatisfaction was expressed about the raising, by the Price Controller, of the prices of certain fertilizers as from 9 February 1945.

These complaints are unfounded, as an examination of the chief reasons underlying the increase will reveal.

They are the following:—

- (1) Higher prices of imported rock phosphate;
- (2) Increased costs of factory, due mainly to higher wages, higher prices of bags and higher expenditure on the maintenance of factory equipment; and
- (3) increased prices of certain ingredients used in mixed fertilizers, especially fish meal, which is an important ingredient of organic mixtures.

The manufacturers do not make unreasonable profits on these prices; in fact, owing to the considerable rise in the costs of the abovementioned items, their profits are actually lower to-day than prior to the raising of prices.

It stands to reason that the fertilizer shortage led to an enormous increase in the demand for *karroo and other manures*. The prices rose out of all proportion to the value of the commodities and moreover in many cases the quality was poorer. Consequently, for some time past consideration has been given to the institution of measures to check these malpractices. Since the quality of manure varies from area to area, this is obviously no easy task. In January 1945, however, the first step was taken, and a restriction was imposed on the transport of fertilizers which are not of the desired quality. Persons dealing in fertilizers must be in possession of a permit issued by the Controller of Fertilizer, authorizing them to sell such fertilizers and to secure the necessary transport facilities. Such permits are issued only if the Controller is satisfied that the fertilizers are of the requisite quality and that the seller is charging a reasonable price commensurate with the chemical composition and fertilizing value of the product.

Where it is established on the grounds of complaints (supported by specimens) received from farmers, or otherwise, that the fertilizer sold by a holder of a permit is not of the nature, composition or quality as claimed in the application form, such a permit is cancelled.

No application for the transport of fertilizer by Rail Motor Service, is considered by the South African Railways and Harbours, unless the consignor is in possession of a permit. Arrangements have been made with these authorities to enforce this regulation.

The second and equally important step came at the close of the year under review, when it was definitely decided to fix prices for the principal fertilizers. Accordingly, the following maximum prices were announced in Government Notice 1708 of 14 September, 1945:—

Crude manure: 14s. per ton f.o.r. consignor's station.
 Sifted manure: 16s. per ton f.o.r. consignor's station.
 Milled manure: 30s. per ton f.o.r. consignor's station.
 Crude compost: 16s. per ton f.o.r. consignor's station.
 Sifted compost: 30s. per ton f.o.r. consignor's station.
 Agricultural lime: 20s. per ton f.o.r. consignor's station.

When the product is delivered in bags, the seller is entitled to an additional 1s. per bag.

The campaign for the encouragement of *compost-making* is being vigorously pursued, and is bearing fruit on many farms.

The smaller municipalities are also being urged to utilize night soil and other organic materials for making compost. This campaign, too, has been attended by striking success and there are at present 81 municipalities manufacturing approximately 70,000 tons of compost annually. The ever-increasing production of compost is having a very salutary effect both on food production and on soil conservation.

The Production of Guano surpassed all expectations, and the collection, transport and allotment were carried out with more than the customary speed. At the end of the season, however, exceptional misfortune was experienced in that the largest cargo boat hired for the transport of guano ran ashore, with a cargo of approximately 422 tons on board. Fortunately, the guano output was sufficient to make good

the loss of the 422 tons and it was possible to fulfil all obligations towards the farmers to whom guano had been allocated. Naturally, the allocation for next year will be reduced to the extent of this loss.

Owing to the general shortage of fertilizers, the demand for guano continues to be far in excess of the supply, with the result that allocations must necessarily be curtailed. A total of 6414 applications was received for guano to be used as follows:—

<i>Wheat.</i>	<i>Vegetables.</i>	<i>Onions.</i>	<i>Potatoes.</i>
morgen.	morgen.	morgen.	morgen.
305,765	34,779½	10,176½	43,226

Number of bags allocated: 72,783.

The price of guano was raised from £9 to £10 per ton, which, as farmers know, is very low in comparison with the prices of other nitrogenous fertilizers.

Agricultural Implements and Requisites.

The Government devoted special attention to the importation and local manufacture of agricultural implements, machinery, jute goods, wire, etc. In this field, too, we were largely dependent upon imports before the war. Notwithstanding a severe shortage of shipping space, *importation* was continued, but these commodities became very scarce, especially during the years 1940 to 1943. Since the improvement in the shipping condition, there has been a considerable increase in the importation of numerous articles and the position in general has been appreciably eased.

The period under review was not characterized by increased importation only, but also by an improvement in the quality of the locally-manufactured articles. Moreover, the control measures in respect of imports have gradually been relaxed and reports state that as from 31 October, 1945, the Organization of the Controller of Agricultural Implements, Machinery and Requisites will, for all practical purposes, cease to exist as a separate unit. Thus, for example, the *control* over the sale of grain, potato and salt bags made of jute has been lifted, and permits in respect of windmill heads and towers have been abolished. The same applies to permits in respect of all engines of less than 20 horse power, and from 1 October, 1945, farmers will be able to secure 30 rolls of barbed wire without a permit. Control will be continued only in the case of the acquisition and sale of caterpillar tractors, applications for barbed wire from non-farmers where more than 30 rolls are required, and the issue of permits for binder twine.

On a weight basis, roughly 15,670 tons of the principal types of agricultural implements, machinery, and spare parts were imported during the first 8 months of 1945, as compared with 11,100 tons for the first 8 months of 1944, and 4,770 tons for the same period in 1943. In the case of a few important items, such as tractors, ploughs with more than one share, cream separators, etc., imports for the first 8 months of 1945, exceeded the total for 1944. The total figure for all articles imported in 1945 (first 8 months) is only about 2,700 tons lower than the total for 1944 and approximately 7,200 tons higher than the total for 1943. The total net weight of the oversea orders for 1945-46 amounts to approximately 30,000 tons.

Very good progress was also made with the *local manufacture* of agricultural implements and spare parts. The efforts made in 1944 to improve not only the quantity, but also the quality of locally-

manufactured articles, led to a material improvement. In so far as quantities are concerned, the production was roughly 10,000 tons in 1943. From this the figure rose to 14,500 tons in 1944 and an estimated total of 16,000 tons for 1945. The progress is all the more striking if the fact is taken into consideration that in the case of certain articles, production was retarded by temporary shortages of certain types of steel and the alteration of the specifications for certain prescribed types of steel, with a view to quality improvement. There was such a big improvement in the production and quality of certain types of articles, that it was even possible to export to other African states.

Although numerous difficulties in respect of local manufacturers have been overcome, others are still awaiting a solution, especially if the local product is to compete with the imported article in the post-war period.

In so far as *wire* is concerned, galvanized barbed wire continues to be the most difficult item to supply. During 1944 only 2,000 tons were received from overseas and this supply was issued to farmers under permit. During the first 8 months of 1945 approximately 3,200 tons were obtained from overseas and distributed among about 6,900 farmers. No appreciable improvement in the position is expected before the end of 1946. Nevertheless, distribution and control will be relaxed from October 1945 in so far as *bona fide* farmers are concerned.

With regard to plain wire the position is, fortunately, quite satisfactory and permits have been abolished. Since the end of 1944 baling wire, including binding wire, has been released for all agricultural purposes. Ten tons of wire per month are still withheld for construction works on farms and distributed among farmers under permit. The permit virtually serves as a guarantee to the applicant that he will obtain this special wire.

In so far as *binder twine* is concerned, roughly 43,400 bales were sold to farmers during the 1944-45 wheat season (on the basis of 500 ft. per lb. of twine), as compared with 56,600 tons the previous year. The decrease is due mainly to the smaller crop. In view of the expected effect of hampering factors during the coming season, the country's requirements in respect of binder twine for the 1945-46 crop, will be less than 45,000 bales. Not only is there sufficient binder twine to meet the country's requirements, but in consequence of a stipulation that a proportional percentage of the surplus imports of 1944 is to be mixed with locally-manufactured binder twine, practically the entire surplus was also disposed of. This step is fully justified, in as much as the supplies of binder twine had to be imported long before any estimate of the crop was possible, and it is in the interests of farmers that the Government should take timely steps to ensure that there are adequate supplies in the country. As soon as this surplus has been completely wiped out, control over the distribution of binder twine will be lifted.

For the twelve months ended 30 June 1945, approximately 53,000 tons of *jute goods*, to the value of roughly £4,000,000 were imported. Owing to the poor crops of the past few years, all the bags imported by the Government were not taken by farmers. In this connection, too, the Government could take no risk, and the bags were ordered long beforehand. Because of the crop failures, an appreciable quantity of surplus bags had to be stored in the Union. In view of the increase in the demand for jute goods since the cessation of

hostilities, the carry-over will undoubtedly be taken up and controlled importation will have to be continued for a further period.

Although the Controller of Agricultural Implements, Machinery and Requisites did not fall under the Department of Agriculture, its Organization worked in very close collaboration with the Department and rendered an important service to the farming community, particularly in regard to the provision of essential production requisites.

Agricultural Education.

The re-opening of the Colleges of Agriculture in February 1946 was another big forward step, for more agricultural knowledge is an essential requirement for improved farming and the increased production resulting from it.

A programme of short and special courses was drawn up for the first part of the year for civilians as well as soldiers and ex-volunteers. The courses were attended by about 570 students, the majority of whom were civilians. The poor attendance of soldiers and ex-volunteers is due to two main factors, viz. (a) the inability on the part of soldiers to obtain the necessary military leave and insufficient publicity given to the course; and (b) the absence in war zones outside the Union of the major portion of the Union Defence Force.

A further programme was drawn up for the period July-December 1945.

This programme embraces a repetition of the special sheep and wool course at Grootfontein, two special courses of 2 months each for the training of soil-erosion foremen, also at Grootfontein, short courses at Glen, and series of short courses "chain courses", at Cedara and Potchefstroom. The so-called "chain courses" consist of a series of short courses, each of 2 to 3 weeks' duration, dealing with a specific branch of farming.

The full series of four courses at Cedara consists of:—farm mechanics (3 weeks), dairy and pig farming (2 weeks), poultry farming and vegetable growing (3 weeks), and farm crops and farm management (3 weeks).

Potchefstroom offers a similar series and students can enrol for one or more, or for the full series. Such a series offers a good refresher course to farmers who have been in the army for four or five years, and to persons, with a modicum of farming experience, who wish, after their discharge from the forces, to go in for farming on their own or perhaps on a settlement or on crown land. The first of these series of courses has drawn a satisfactory measure of support, and it is expected that they will prove a great success.

Special courses, of 6 months at Cedara and 12 months at Potchefstroom, were commenced in August 1945 for training selected soldiers as instructors in Agriculture on the settlements where ex-volunteers will be placed.

It is anticipated that the coming year will witness a heavy demand for agricultural education of ex-volunteers and civilians and the programme which has been drawn up for 1946 is designed to encourage the maximum utilization of the accommodation and facilities offered by the Colleges of Agriculture. The main features of this programme are the following:—

- (a) The Two-year Diploma Course will be recommenced in January, 1946, at Potchefstroom, Grootfontein, Glen and Cedara;

- (b) A Special Senior Diploma Course will be held at Cedara for students of all the Colleges of Agriculture who interrupted their studies to enlist in the forces, to enable them to complete their courses without any further delay.
- (c) Special Sheep and Wool courses of three months each will be held at Grootfontein and Glen.

In order to meet the expected demand for intensive training of short duration and simultaneously to recommence the normal regular courses, it will be necessary to limit the number of students for each course in accordance with the available accommodation in the hostels and the number of students whom it will be possible to train satisfactorily with the aid of practical work and demonstrations. In these circumstances, the schemes for 1946 have been devised on a basis of 120-130 students in the Diploma Course, 130-150 in the Special Sheep and Wool courses and other special courses and over 2,000 in short courses of 2 to 3 weeks each and the series of short courses.

It is evident that a good start has once again been made with agricultural education.

III. Principal Food Products.

THE following data in connection with individual food products reflect the position in regard to these products during the year.

Maize.

The 1944/45 Season.

The 1944-45 maize season started with a crop estimate of approximately 18 million bags of maize, and it was clear, therefore, in view of the experience during the similar poor season of 1942-43, that more drastic measures than those applied in the past would be necessary for regulating the flow of maize, in order to ensure supplies for the entire season and to make provision for as large a carry-over to 1945-46 as possible.

In these circumstances, it was decided to adopt a new policy in regard to control over the maize industry, by vesting in the Mealie Industry Control Board the sole right of purchasing maize from producers, at least in the principal production areas. The necessary legal powers thereto already existed by virtue of both War Measure No. 20 of 1942 and an amendment to the Board's scheme by Proclamation No. 147 of 1942, but hitherto, the Board had not exercised its powers and had regulated distribution, to a certain extent, through the medium of control over elevator maize, and partly also in accordance with arrangements with the co-operative societies, whereby a certain degree of control over the marketing of supplies in their possession was vested in the Board.

The Mealie Industry Control Board acted as sole buyer of producers' maize only in the principal production areas, the two northern provinces and the Vryburg and Mafeking districts, while in the rest of the Union the former arrangements held good. Purchases in the abovementioned areas were carried out by agents—the various maize co-operative societies, as well as persons previously registered with the Board as maize dealers.

In practice, this arrangement initially brought about no substantial change in the system previously applied. All agents were

authorized, subject to the permit regulations, to sell all maize taken in from producers, so that distribution could continue in the usual manner and through the usual channels. The only difference was that sales had to be made under permit on behalf of the Board, and that the agent received compensation in respect of handling and storage, instead of the customary profit which would have accrued to him if he had sold on his own account. In addition, from time to time at the request of agents, certain quantities of maize in their possession, were exempted from permits and agents were free to dispose of the released maize on their own account. An important factor, however, was that the Board was in a position at any given time, to take complete control over all maize in possession of agents should the exigency arise, and unfortunately, the necessity for enforcing this power was not long in arising.

In view of the small crop and the increased costs of production, the price to the producer was fixed at 1s. 6d. per bag higher than that of the previous season, viz., 17s. 6d. per bag for the best grades in the case of maize in bags. In the case of elevator maize the price was reduced by 1s. 1d. per bag, and in the case of other loose maize, by 2s. per bag, while in the case of parcels of less than 200 lb., the price was fixed at 1d. per lb. and subsequently changed to a minimum of $\frac{3}{4}$ d. and a maximum of 1d. per lb. Prices for seed maize were fixed at a minimum of 20s. per bag.

In order to maintain the price to the consumer at the same level as during the previous season when the price to the producer was 16s. per bag for the best grades, the Government decided to pay a subsidy of 1s 6d. per bag. Consequently, the maximum selling price could be fixed at 18s. 7d. per bag. This price was intended for sales in small quantities, i.e., a maximum of nine bags at a time, and where larger quantities were sold, it was intended that the price should be correspondingly lower. To ensure this, the following scale of selling prices was prescribed for agents selling on behalf of the Board, in accordance with the quantities sold in a batch:—

Quantity Sold.	PRICE PER BAG.		
	Grades 2 and 6.	Grades 3, 4, 5 and 7.	Grade 8.
	s. d.	s. d.	s. d.
Not less than 5,000 bags.....	17 1	16 11	16 8
Less than 5,000, but not less than 500 bags....	17 3	17 1	16 10
Less than 500, but not less than 100 bags.....	17 5	17 3	17 0
Less than 100, but not less than 50 bags.....	17 7	17 5	17 2
Less than 50, but not less than 25 bags.....	17 10	17 8	17 5
Less than 25, but not less than 10 bags.....	18 1	17 11	17 8
Less than 10, but not less than 1 bag.....	18 7	18 5	18 2

A new principle introduced in this connection was the maintenance of one constant price throughout the season, instead of the former practice of making provision for a gradual rise in the price, from September onwards to cover storage costs. The Board, as sole buyer of producers' maize, was in a position to do this, since it paid all storage costs and could therefore without any difficulty calculate the average expenditure on this item for the season.

In so far as prices for maize products were concerned, it was necessary to allow certain increases in comparison with the previous season, since manufacturing costs had in the meantime increased

PRINCIPAL FOOD PRODUCTS.

to a certain extent. The following prices were fixed for the various products:—

Product.	Millers.	Distributors.
	s. d.	s. d.
Fine granulated meal.....	19 1	20 7
Unsifted granulated meal.....	18 9	20 3
Unsifted meal other than unsifted granulated meal.....	18 3	19 9
Sifted crushed maize.....	18 9	20 3
Unsifted crushed maize.....	18 3	19 9
Samp.....	24 2	25 8
Mealie rice.....	24 2	25 8
Maize-germ meal.....	11 6	13 0
Hominy Chop.....	10 0	11 6
Mealie bran.....	6 2	7 8

The same conditions which applied in regard to prices, during the previous seasons, for example, in connection with transport costs, sales in small packings, etc., applied this season, except that in consequence of the 10 per cent. increase in railway rates, a corresponding increase was allowed in the prices of maize transported by rail.

In order to place distributors in Natal and the Cape Province, with the exception of the Vryburg and Mafeking districts, in the same position as those in the rest of the Union, an equalisation levy of 7d. per bag was imposed on all maize purchased from producers by registered traders in the first-mentioned areas. This sum represents the difference between the basic figure at which selling prices are fixed and the price at which the Board sells wholesale quantities of maize.

In view of the fact that a wholly new principle was introduced this season, in that the Board itself acted as the sole buyer of producers' maize in the chief production areas, it was deemed necessary to assign to a small committee, consisting of the Chairman and two members of the Board, the duty of assisting the Management in the initial stages in the event of conditions arising in the application of the new regulations upon which the Manager could not reasonably be expected to make decisions on his own responsibility, as well as to furnish him with advice.

One of the first problems was that of finding accommodation for the new season's maize. There was a carry-over of approximately 3,000,000 bags from the previous season, the bulk of which was in the hands of co-operative societies, although appreciable supplies were also in grain elevators. Naturally, both the co-operative societies and the Railway Administration were anxious to get rid of the old maize so as to be able to clear their storage space to make room for the new deliveries. The marketing, on the other hand, as is generally the case at the commencement of a new season, was a comparatively slow process.

The crop was concentrated mainly in the western and northern Transvaal and parts of the south-western Orange Free State, and, moreover, started coming in slightly earlier than usual. Consequently the total quantity of maize which was placed on the market was considerably in excess of what it would have been with a total output of only about 18 million bags, had the production been distributed over the whole country, in which case producers would, on the whole, have retained larger quantities on the farms.

In order to ameliorate the position in this respect, and having regard to the fate which befell moist maize stacked in the open during the 1943-44 season, plans were devised to find a way out of the difficulties. Several expedients were considered, and it was finally decided:

(a) That all maize under cover be frozen until such time as the supplies stacked in the open are disposed of and that the Board undertake direct control over the marketing of these supplies, while sales by agents be restricted to small quantities for local consumption; and

(b) that arrangements be made to assist the co-operative societies in obtaining bucksails from the Department of Defence for covering maize stacked in the open, and that, subject to certain conditions, the Board should undertake payment of the Land Bank interest on such maize.

Furthermore, it was decided to transport as much of the maize stacked in the open as possible to grain elevators with accommodation, at the Board's expense. As an additional measure for expediting the moving of the maize stacked in the open, all traders in the native territories, where transport problems frequently present difficulties, were approached with an offer of additional allotments under permit as a reserve for subsequent use should difficulties be experienced in obtaining essential supplies in the course of the season, owing to lack of transport facilities.

In addition, special concessions were granted for disposing of the remaining old season's maize which had already been considerably damaged by weevils and for which the demand was poor, since buyers preferred the fresh new season's maize. *Inter alia*, prices were slightly reduced, and where supplies had to be transported over long distances, the Board bore a portion of the railage costs, while the permit regulations in respect of the old season's crop were temporarily abolished.

These measures had the desired effect, and before the end of the year, a very small percentage of the maize which had been stacked in the open remained unsold, although considerable quantities still had to be consigned by rail.

For a while matters progressed without a hitch, but the relief was short-lived, for the maize stacked in the open had barely been disposed of, when the possibility of a shortage once again demanded special attention.

The estimated crop of approximately 18 million bags, which more or less corresponded with the final figure, was concentrated mainly in the western and northern Transvaal and parts of the north-western Orange Free State. In other parts the crops were so poor that many farmers did not have sufficient maize for their own use. For this reason the deliveries constituted a considerably higher percentage of the total yield than would have been the case with a generally distributed crop, in view of the fact that in normal years producers retain an estimated quantity of about 10 million bags for their own use. The actual deliveries, which amounted to slightly more than 11 million bags, were, however, still considerably higher than had been expected, for with a carry-over from the previous season of more than three million bags, it was expected that a considerable quantity of maize would be carried over to the following season. Moreover, during a considerable part of the sowing season prospects were so good that the general opinion was that there would very nearly be a bumper crop, and many a person had already begun to feel uneasy about the problem of disposing of so much maize.

Unfortunately, the condition progressively deteriorated as the year 1944 drew to its close, and although even in December, the hope was still cherished that the crop would at least meet the country's requirements, it gradually became evident that the situation would by no means be bright. The cycle was completed, and it soon became abundantly clear that, whereas the season commenced with a somewhat troublesome localised surplus problem, it would end with a very much more serious general-shortage problem.

As the supply position, in consequence of the continuous drought, became increasingly difficult, a corresponding increase in the demand for maize took place. During the month of December the consumption had already run into one and a half million bags. If this were to have continued supplies would have been exhausted long before the end of the season, and consequently drastic action was necessary to curtail consumption in order to ensure supplies for the whole season and, in so far as it was possible, retain a carry-over, especially having regard to the fact that the following season's crop was also expected to be poor:

Consequently, the first curtailment in the grants under permit to consumers was made as from February. Initially only grants in respect of stock feed decreased, but later still more drastic curtailments became necessary, and the grants for human consumption had to be reduced as well. In addition, it was necessary to curtail permit-free sales, while less leniency had to be displayed in dealing with the large numbers of fresh applications for permits. These methods led to some improvement in the position, but nevertheless the carry-over to the following season was comparatively small if account is taken of the fact that once again a poor crop was expected and that in view of its being more widely distributed this time, a proportionately smaller quantity of maize would reach the market.

An additional problem which arose in connection with the distribution of maize, was that of furnishing yellow maize for essential purposes. The Board took control over sales only late in the season. In the meantime agents sold directly, and owing to the short crops in the principal yellow-maize production areas, the supplies were inadequate to meet all the demands for the season. As long as the agents undertook sales themselves there could, of course, be no co-ordination of sales, and early in 1945, after the Board had once again taken control over sales, it was found that it would be necessary to take special steps to set aside yellow maize, which is so essential for poultry and pig feeding, for this purpose only. This was accomplished by the issue of special permits for the purchase of yellow maize and the replacement of sales by traders from the Board's supplies against such permits only. Fortunately, this measure had the desired effect.

The 1945/46 Season.

The regulation by virtue of which the Board, from the beginning of the 1944-45 season, acted as sole buyer of producers' maize in the principal production areas was, initially, subject to the understanding that the Board would abandon it directly it did not prove a success.

Despite the manifold difficulties which were experienced, this regulation was carried out with a fair measure of success and was, in fact, the only means which made it at all possible to cope with the position which subsequently developed. In the absence of this regulation, it would have been impossible, in spite of the permit system, to regulate distribution on an equitable basis or to ensure supplies for the whole season.

In view of the fact that the position during 1945-46 was still very much less favourable than during 1944-45, all control was again vested in the Mealie Industry Control Board. In addition, it was decided that right from the outset the Board would undertake all sales, except those in small quantities for local consumption.

According to estimates in July, based on the threshing results, the crop was placed at 17,870,000 bags. On the other hand, the carry-over from 1944-45 was rather small, and since the deliveries were expected to be very much smaller than would have been the case with a more or less similar crop in the aforementioned season, it was evident that the supplies would have to be husbanded from the very outset. Full control was therefore more necessary than ever before for regulating distribution.

Prices to producers were fixed at 19s. per bag. Of this amount, the Government contributes 2s. 6d. per bag by way of a subsidy, making the basic price, upon which consumers' prices rest, 16s. 6d. per bag, instead of 16s. per bag as in the two previous seasons. There was, however, also an increase in handling and storing costs, due mainly to increased labour costs and the expected smaller sales, and consequently, the selling prices had to be proportionally fixed at one penny higher per bag than last season. The Board's prices vary from 17s. 8d. to 19s. 2d. per bag for the best grades, according to the quantity sold. The latter amount also represents the maximum selling price in the trade.

One change which was introduced was the inclusion once again of grade 4 maize among the best grades, as in 1943-44. The price for loose maize in quantities of less than 200 lb. was fixed at 1d. per lb.

No change was made as regards the difference in respect of maize crops, and the prices of the different classes of products were therefore fixed as follows:—

Product.	Miller's price per bag.	Distributor's price per bag.
	s. d.	s. d.
Fine granulated mealie meal.....	19 8	21 2
Unsifted granulated mealie meal.....	19 4	20 10
Unsifted mealie meal other than unsifted granulated mealie meal.	18 11	20 5
Sifted crushed maize.....	19 5	20 11
Unsifted crushed maize.....	18 11	20 5
Samp.....	24 9	26 3
Mealie rice.....	24 9	26 3
Maize-germ meal.....	11 9	13 3
Hominy chop.....	10 3	11 9
Mealie bran.....	6 3	7 9

The equilisation levy of purchases by dealers from producers in Natal and the Cape Province, with the exception of the Vryburg and Mafeking districts, was fixed at 8d. per bag.

As has been pointed out, difficulty had been experienced in regard to the provision of maize, already before the season commenced. The old season's supplies were practically exhausted, and the quantities still available were concentrated in only a few co-operative depôts. These depôts therefore had to meet the entire demand, which naturally was no small task; moreover, railway facilities could not always be provided with the necessary speed.

Eventually, it once again became necessary to take special steps for furnishing adequate supplies for immediate consumption. An appeal was made to producers to expedite early deliveries and, in addition, a premium of 6d. per bag was offered on all deliveries up to 9 June. It was also announced that agents of the Board could, according to their own discretion, take in maize with a moisture content of 15 per cent., subject to a reduction in the price in accordance with the additional moisture content. The premium was, however, paid in respect of such maize too. This measure had the desired effect, and the Board was enabled to procure the necessary supplies in good time.

Another problem which arose was that of transporting those supplies which had been delivered by producers, to the mills, without delay, in order that the latter could be kept going. Delays had occurred owing to the fact that the Board did not have immediate supplies available, when required. Consequently, arrangements were made enabling millers, subject to previous approval by the Board, to take over maize directly from agents who had supplied them in the past, and the parties concerned made their own arrangements in regard to payment for the quantities delivered.

Notwithstanding the short crop, the accumulation early in the season at certain points of larger quantities of maize than could be placed under cover gave rise to a problem, but this time it caused no anxiety, for the Board was in a position through direct control to make timely arrangements for bringing the surplus maize into distribution. Provision had, however, to be made for bucksails to cover the maize stacked in the open for the time being, until such time as it could be moved.

In order to supplement the available quantities of maize, strenuous efforts were made long before the beginning of the season to import maize. Although importation took place, it was by no means on the scale warranted. The supplies available in the adjacent territories are small. Nevertheless, approximately 600,000 bags were obtained, 250,000 from Kenya. The big problem is the small crop in the Argentine and the difficulties in the way of making suitable arrangements for importation from that country. Efforts at increased importation are being vigorously pursued.

In view of the supply position, further drastic changes in the rationing system were unavoidable. In so far as it was possible, it was endeavoured to introduce the curtailments by degrees and to warn consumers in advance, but nevertheless the latter felt the restrictions keenly, coming as they did just when their maize requirements had increased so appreciably, owing to the prevailing drought conditions.

Reductions were made not only in respect of quantities made available for stock feed and manufacturing purposes, but also in respect of the allocations for human consumption. In this connection, special account must be taken of the large populations in the native territories for whom maize constitutes the staple, if not the only, food. It is in this respect that the rationing system presents the greatest difficulties. The natives can purchase sufficient supplies to meet their needs, without a permit, but it is impossible to determine accurately the actual ultimate destiny of supplies allocated to the trade for this purpose, with the result that illicit selling of supplies probably frequently takes place, making it impossible for the natives to obtain sufficient quantities to satisfy their requirements.

Steps have been taken, however, to establish local committees in

the principal native territories, to regulate the distribution of the available supplies among dealers and to supervise the sale thereof. Previously, there was already a general committee in existence for the Transkei as a whole, and a number of regional committees have now also been established in the Ciskei and Zululand, while it is intended to establish similar committees in the northern Transvaal native territories. A striking feature is that in many cases some of the committees recommend smaller allocations than had previously been granted by the Board.

Further measures for curtailing consumption consist of a reduction of permit-free purchases in the larger urban areas where other foodstuffs which can be substituted for maize are more easily obtainable and a prohibition on the manufacture of sifted mealie meal, samp and mealie rice. The prohibition on the latter two products is also calculated to curtail consumption in the case of persons who are in a position to obtain other foodstuffs, since these products are consumed mainly by Europeans and perhaps in a lesser degree by non-Europeans in urban areas.

Early rains, judicious distribution and increased importation are necessary to prevent a serious maize crisis.

Kaffir Corn.

During the 1944-45 season an exceptionally good kaffir corn crop was harvested. Consequently, the price to the producer was comparatively low initially, and representations were made to the authorities from several quarters urging that steps be taken to control the position and fix prices. In due course a minimum price of 16s. per bag was fixed. As producers sold their crop, however, prices evinced an upward trend, rising ultimately to approximately 25s.; in fact, on occasion up to 27s. per bag was paid. At this stage a maximum price of 22s. 6d. per bag was fixed.

Another extraordinary feature was that, notwithstanding the exceptionally good crop, there was almost no kaffir corn at the end of the season. In addition, the prospects for 1945-46 were poor, and in these circumstances, the Department suggested that the Mealie Industry Control Board take control over this product as well.

The Board signified its willingness, and since the new season was already close at hand, it immediately appointed a committee from among its members to investigate the position and make recommendations in regard to the system of control and cognate matters. On receipt of the report of the committee, the Board decided on the system of control and prices.

Although the necessary control measures were announced in the *Government Gazette* on 30 April, the Board could not assume control immediately. Agents had to be appointed to take in kaffir corn from producers, and arrangements had to be made in connection with the importation and application of a permit system in respect of the distribution of supplies. This naturally called for additional labour, and consequently, it was not before the beginning of June that control was actually commenced.

According to the first preliminary estimate, the crop amounted to about 960,000 bags, but subsequent estimates pointed to a gradual decrease in this quantity, until at the time of the last estimate, the crop amounted to only about 600,000 bags. On the basis of sales in previous years it was calculated that of this quantity, between 300,000 and 400,000 bags would be delivered to agents of

PRINCIPAL FOOD PRODUCTS.

the Board, and allocations for various purposes were provisionally determined on this basis.

The computation of allocations was based on the premise that the first essential was to meet the full requirements for seed and the manufacture of infant foods, applications for malt being second on the priority list. The requirements in respect of infant foods are not big amounting to only a few thousand bags per annum, and consequently these made little difference to the quantity which remains available for other purposes.

Applications for seed are expected mainly from the native territories where there was practically no crop last season. Arrangements have, however, been made for storing 10,000 bags in the grain elevator at Klerksdorp, from where requirements will be drawn. Should these stocks not be completely taken up, it will always be possible to dispose of them without any difficulty to malt manufacturers.

The biggest demand for kaffir corn is, of course, for the manufacture of malt, and since there are by no means sufficient stocks to meet the demand for this purpose, it was deemed necessary to carry out the distribution of the supplies available for the purpose on a priority rating. Consequently, the first to be considered are the requirements of the big employers and municipalities which have opened beer halls, and in these cases the allocations granted were equivalent to 45 per cent. of their average consumption in the past. In other cases, i.e., for distribution to private buyers, the allocation is 20 per cent. in areas where there are no municipal beer halls, and 5 per cent. where such beer halls do exist.

With regard to allocations to malt manufacturers, a quantity of kaffir corn equivalent to the average monthly sales during the previous twelve months was granted initially. Subsequently, however, the allocations were reduced and the position at present is that replacements are allowed only in respect of sales against permits, and in such cases only up to a maximum of 50 per cent. of the former average sales of the manufacturer concerned, subject to a subsidiary allocation of 5 per cent. to compensate for a loss of weight in the manufacture of malt.

Originally permit-free sales of kaffir corn and malt up to a maximum of 200 lb. per month, were allowed to any person, but subsequently, in view of the supply position, sales were reduced to 50 lb. in the case of kaffir corn and 25 lb. in the case of malt.

For the rest, supplies are granted only for the manufacture of meal and breakfast foods on the basis of 20 per cent. of the average sales during the previous year. The permit system originally instituted was abolished in this respect, on the understanding that manufacturers distribute their supplies on a more or less uniform basis among all their customers.

The above arrangements were made on the assumption that between 300,000 and 400,000 bags would be placed on the market. This expectation was, however, not realized, since up to the end of August, when by far the majority of producers had presumably already completed their deliveries, the total receipts by the Board's agents were only about 110,000 bags. There will probably be further deliveries, but these are not likely to amount to more than approximately 50,000 bags.

It is difficult to explain this phenomenon, but perhaps it can be ascribed to the fact that producers are, under present conditions,

rather reluctant to dispose of all their kaffir corn and consequently retain more on the farm. On the other hand, this cannot possibly be the sole reason, and it would appear as if there is some truth in the frequently repeated allegation that illicit purchases take place on a large scale.

The endeavours to import supplies were also not successful, although certain quantities could be procured. In these circumstances, the imposition of further restrictions on consumption will be essential in order to tide over the season. It will be necessary to set aside certain stocks for seed purposes, and, of course, supplies for breakfast and infant foods cannot be held back, but it is intended, as from October, to make allocations for the manufacture of malt only and simultaneously to prohibit sales without permits altogether, while permits will then be issued only to big employers and municipal beer halls.

In making kaffir corn malt available as from October to big employers and licenced beer halls only, the Government was actuated by two factors. The first and principal consideration is the prevention of social dissatisfaction in areas where there are large concentrations of native employees, as on the gold and coal mines, on sugar plantations, in cement factories and in the municipal areas of the larger cities. Over a period of years natives in these areas have grown accustomed to their kaffir beer, and its total withdrawal will give rise to serious dissatisfaction. Secondly, in view of the scarcity, malt manufacturers started turning their attention to the possibility of utilizing other cereals for the making of malt for kaffir beer. A large number of cereals such as nyati (kaffir millet), millet, rapoko and buckwheat have been found to be suitable for the purpose, and all available supplies were purchased by the manufacturers. Furthermore, efforts are being made to import some of these products for malt-manufacturing purposes, and already import permits for about 45,000 bags of nyati have been issued. The malt manufactured from these products is not controlled and can, therefore, be used in the place of kaffir-corn malt. For the time being, it is proposed to place only the manufacture of these products under control and to leave the sale thereof completely uncontrolled. If with the passage of time, the available stocks of kaffir-corn malt appear inadequate for supplying employers and municipal beer halls, steps could perhaps be taken to reserve a portion of the other types of malt for that purpose.

The unexpectedly small deliveries by producers in comparison with the estimated crop, and the consequent considerable decrease in the sales of the malt manufacturers, necessitated a revision of the prices of malt. These prices are based on calculations of actual costs with an allowance for the expected smaller sales as compared with those of normal years.

Wheat.

The 1944-45 crop proved to be even poorer than indicated by the final estimate. This estimate placed the crop at 4,220,000 bags, while according to the threshing-machine returns received by the Wheat Board, it is only 3,373,430 bags. The crop is, therefore, two million bags less than that of 1943-44 and three million bags less than that of 1942-43. As reflected by the threshing figures below, the crop of the Cape Province is reasonably constant, the decline being particularly striking in the Free State, where last

PRINCIPAL FOOD PRODUCTS.

season's crop amounted to only approximately 10 per cent. of the bumper crop of 1942-43. The Transvaal crop was also disappointing.

Province.	Season, 1942/43.	Season, 1943/44.	Season, 1944/45.
Cape Province.....	2,797,027	2,707,463 -	2,626,056
Transvaal.....	774,851	842,956	483,969
Orange Free State.....	2,585,307	1,784,638	263,352
Natal.....	989	837	53
	6,158,174	5,335,894	3,373,430

The extremely disappointing crop in the Orange Free State must be ascribed to the exceedingly dry autumn and winter in which very little wheat was sown, and to plant lice which considerably damaged such wheat as was on the lands. The poor Transvaal crop is due mainly to untimely frost and cold winds which caught a large percentage of wheat in the critical flowering stage, with the result that the yield was particularly poor.

The difficulties experienced in making good through importation the quantity of wheat required for supplementing the difference between local consumption and production, was considerably aggravated by the short crop. In view of the poor crop and the great difficulty experienced in obtaining shipping for the imports, it was impossible to relax the measures for husbanding wheat (such as the use of a standard loaf etc.); on the contrary, efforts had to be made to effect further economies. On the recommendation of the Wheat Industry Control Board, it was decided as from 1 January 1945, to withdraw the limited quantity of domestic flour and self-raising flour which had formerly been supplied to the public. Only persons suffering from serious stomach ailments and to whom the necessary coupons have been issued by the Wheat Industry Control Board, are entitled to 10 lb. of flour per month. It is estimated that these measures entail a saving of approximately 170,000 bags of wheat per annum.

It was decided to import 80,000 tons (896,000 bags) of wheat. Efforts were made to obtain the entire quantity from Canada, but owing to insuperable difficulties in connection with obtaining the necessary shipping half the quantity (40,000 tons) was imported from the Argentine in boats of the South African Railways and Harbours. When, subsequently, it became evident from the threshing returns and the purchases of wheat, that still more wheat was required, it was decided to import a further 20,000 tons (224,000 bags) from Canada, bringing the total up to 1,120,000 bags. If the 80,000 bags obtained from Australia are added, the grand total is 1,200,000.

Owing to the fact that in consequence of a serious drought, Australia had a very poor wheat crop, the Union was advised in October 1944 that Australia could not supply any wheat. Consequently, during the past twelve months only three shiploads with a total of 81,162 bags entered the Union from Australia. This wheat represented purchases made some months earlier for subsequent shipping.

The shipping position was so difficult at the beginning of 1945 that wheat could be imported only at the expense of other commodities. The difficulties were aggravated by the fact that all arrangements had already been made for importing the wheat from Australia. It thus became necessary to alter the arrangements.

The result was that the first wheat from the Argentine and Canada did not reach the country before the end of June. The fact that the wheat arrived so late, in turn created fresh problems for the Board in regard to the distribution of local and imported wheat. Distribution had to be carried out in such a manner as to effect an equitable division in respect of differences in quality and to obviate as far as possible unnecessary transport to and fro.

This was made possible only by the special reserve of over a million bags which had been built up in the form of a carry-over. The importance of a reserve was once again abundantly proved, since it made proper distribution possible; moreover, in view of this reserve, it was also possible not only to tide the country over the past season until the imported wheat arrived, but also to meet a portion of our bread requirements for the year. The difficulties attached to obtaining shipping space for 1,200,000 bags were big enough, and it is hardly necessary to point out how much more serious they would have been and what sacrifices would have been required if it had been necessary to import double the quantity which have been the case if the reserve had not been available.

All the difficulties were, however, surmounted and the distribution of the wheat was carried out without a hitch. It is hardly necessary to emphasize that this was rendered possible only by the fact that the full control of all supplies, local as well as imported, was in the hands of the Wheat Industry Control Board, which could carry out the distribution according to a previously devised elastic plan.

The effect of the serious shortage of maize made itself felt on the consumption of wheat. Already in 1943, it was evident that the shortage of maize and mealie meal had led to an increase not only in the consumption of wheat meal, but also in that of bread. Although the maize ration was not severely curtailed before August, a perceptible increase in the consumption of wheat (released for human consumption only) was noticeable from June onwards. There is every indication that a record quantity of wheat will be milled.

The adverse effect of the shortage of fertilizer on the production of wheat and the decline in the output per morgen with the consequent increased production costs, are well-known facts. For the 1944-45 season wheat producers obtained about half their requirements. In order to encourage the production of wheat and also with a view to discouraging the cultivation of other cereals such as oats (which can do with less fertilizer) at the expense of wheat, the Government, on the recommendation of the Wheat Industry Control Board, already in March 1944 announced the prices of 33s. 6d. per bag for class A grade I, 36s. per bag for class B grade I (other classes and grades in proportion). Subsequently, in October 1944, the prices were fixed by the Wheat Industry Control Board on this basis. The prices are calculated on the basis suggested by the Wheat Commission, amended to make provision for the rise in the prices of the different items making up production costs and for the estimated decrease in the average output from 7 to 6 bags per morgen, in consequence of the shortage of fertilizer.

In order to assist producers in certain areas in the north-eastern Cape Province, in the Orange Free State and in the Transvaal, where a short crop was obtained as a result of unfavourable weather conditions, the Government inaugurated a loan scheme under which wheat producers who could not afford to purchase their seed requirements could obtain wheat and fertilizer on credit. The loan

PRINCIPAL FOOD PRODUCTS.

amounted to a maximum of £45 per applicant in respect of seed wheat, and a maximum of £10 in respect of fertilizer.

The scheme was applied in the following magisterial districts, viz:—

North-eastern Cape Province.....	8 districts.
Orange Free State.....	19 districts.
Transvaal.....	5 districts.
TOTAL.....	32 districts.

A total of 11,495 bags of wheat was issued to 1,009 producers.

The Government decided to continue its policy of subsidizing the price of bread. It was decided, however, to raise the retail price of delivered bread as from 1 November 1945, by $\frac{1}{2}$ d., viz. from 6 $\frac{1}{2}$ d. to 7d. per 2-lb. loaf. As a result of this step the standard loaf was for the first time retailed at the pre-war selling prices of white and also brown bread. It should be pointed out that although the price paid to producers for wheat during the past year was the same as that of the previous year, the margin for millers and bakers was smaller in consequence of increased wages and the increased costs of instruments of production. To enable bakers to sell bread at this price, unsifted meal No 1 had to be available to them at 40s. 6d. per 200 lb. (wholesale price). Millers, in turn, could sell meal at this price only if they could purchase their wheat at 30s. 5d. (Class B grade one in bags—other classes and grades in proportion). The difference between the price of 30s. 5d. and the producers' price of 36s. was made good by a subsidy of 5s. 7d. per bag. The Wheat Board contributed 9d. per bag out of its current levy fund, while the balance was paid by the Government.

In so far as the coming crop (1945-46) is concerned, it was decided, on the recommendation of the Wheat Board, to continue with the policy of announcing wheat prices in advance. It was therefore announced in April 1945, that the price, as compared with that of the previous season would be raised by 1s. 6d. per bag, to 38s. in respect of Class A, grade one, and 37s. 6d. for Class B, grade one (in bags), the prices of the other classes and grades to be in proportion. As was the case in the past, the price was fixed on the basis laid down by the Wheat Commission, account having been taken of the decrease in the average yield per morgen i.e. from 7 to 6 bags and to the increase in the individual cost items as reflected by official statistics.

It would appear that the country is experiencing a period of poor crops. While the fertilizer shortage is a causative factor, there is no doubt that the poor crops are due mainly to unfavourable climatic conditions. Although it is too early to make an estimate as yet, the coming crop will definitely be poor again. Curiously enough, this is due in the south-western Cape Province to excessive, and in the northern Cape Province, Free State and certain parts of the Transvaal to a lack of rain. In the south-western Cape Province, particularly in the Swartland area, excessive rains have already caused considerable damage. In the north-eastern Cape Province and the Orange Free State, very little wheat was sown, owing to the inadequate rains in autumn and early winter, and such wheat as was sown, was adversely affected by the exceptionally dry winter. In the Transvaal the wheat under irrigation is, generally speaking, promising, but crops on dryland and under irrigation in the Northern Transvaal are very poor.

Since estimates are not available either for the coming crop or in regard to the effect of the maize shortage on the consumption of wheat, it is impossible to calculate the quantities of wheat which must be imported during 1946. There is no doubt, however, that on the one hand the crop will be poor and, on the other, consumption will be high. Moreover, the reserve of wheat is also no longer on hand, since it was utilized to assist in making good the shortage during the past year. It is already clear on the basis of the standard loaf, that at least 2,000,000 bags will have to be imported. The position was investigated as early as June, with a view to making early arrangements. Although the quantity to be imported is so large as to eclipse all previous imports, there is nevertheless a ray of light in that an improvement is expected in the shipping position. Since, however, the reversion to white bread will require about $1\frac{1}{2}$ million bags of wheat over and above the abovementioned 2 million bags, the enormous shipping requirements necessitated by such a large-scale importation would have to be almost doubled, and the country will therefore remain without white bread for another year.

Other Winter Cereals.

In terms of Proclamation No. 284 of 6 November 1942, as amended by Proclamation No. 209 of 15 October 1943 and 63 of 24 March 1944, the control over winter cereals (barley, oats and rye) was continued during the past season. Producers are prohibited from selling barley, oats and rye to any person other than the Wheat Industry Control Board. The regulations empower the Minister to fix the grades and the buying and selling prices of the abovementioned cereals. The Minister also fixes the grades of rye flour, rye meal, rye bran and rye bread. The prices of rye flour, rye meal, rye bran and rye bread are fixed by the Wheat Industry Control Board subject to the Minister's approval.

The grades of barley, oats, rye, rye flour, rye meal, rye bran and rye bread were prescribed by Government Notice No. 2377 of 20 November 1942 as amended by Government Notices Nos. 1905 of 15 October 1943 and 1776 of 27 October 1944. The buying and selling prices of barley, oats and rye were fixed as from 1 November 1944 by Government Notice No. 1816 of 27 October 1944, as amended by Government Notice No. 726 of 30 April 1945. The prices of rye flour, rye meal, rye bran and rye bread were fixed by Government Notice No. 1818 of 27 October 1944. The manufacture and sale of rye flour and rye meal, except under a permit issued by the Wheat Industry Control Board, was prohibited by the Food Controller in terms of Government Notice No. 488 of 24 March 1944.

Oat hay is not controlled, except that maximum prices were fixed by the Price Controller.

On the recommendation of the Wheat Industry Control Board the Government announced the prices for winter cereals for the coming season (1945-46) in April 1945. The prices of malt and barley-wheat remain the same, that of feed barley and feed oats have been reduced and those of rye increased. Details are given below:—

Barley.

The purchasing prices (producers) for the 1944-45 season were as follows:—

Class A, first grade (six-row malt barley)...	21s. 0d. per bag of 150 lb. net.
Class B, first grade (two-row malt barley)...	20s. 0d. per bag of 150 lb. net.
Class C, first grade (feed barley).....	15s. 6d. per bag of 150 lb. net.
Class D, first grade (barley-wheat).....	22s. 6d. per bag of 150 lb. net.

PRINCIPAL FOOD PRODUCTS.

The prices of the lower grades of the respective classes were fixed in proportion. The basic selling prices were the abovementioned increased by 7d. per bag in the case of Classes A, B and C (of which 5d. covered the agents commission and 2d. that of the Wheat Industry Control Board), and 9d. per bag in the case of Class D (of which 6d. went to the agent and 3d. to the Wheat Industry Control Board). To cover storage costs, the prices were raised by 3d. per bag per month as from 1 April.

In view of the fact that there were considerable supplies of feed barley, and since it appeared that the price of feed barley in comparison with that maize for feeding purposes was too high, the Government decided to decrease the selling price of feed barley (Class C) for use as stock feed by 1s. 7d. per bag (16s. 1d. plus 6d. storage costs) to 15s. per bag for Grade 1 (lower grades in proportion) as from 1 May 1945. This difference is subsidized by the Government on the understanding that when the producers' price is decreased during the coming season, the selling price of Class C barley for purposes other than for feeds and seed, will not be decreased. The profit accruing will be utilized to compensate for the subsidy.

The following quantities of barley were purchased (A, B and C bags of 150 lb., D bags of 200 lb.):—

Class A	140,850
Class B	25,938
Class C	281,220
Class D	905
	<u>448,913</u>

The quantities of barley of Classes A, B and D were insufficient for the requirements in respect of:—

- (a) Seed;
- (b) beer-brewing;
- (c) malt and yeast.

Consequently, it was decided to supply the full seed requirements, and to distribute the remaining Classes A and B between beer and yeast. The balance of the requirements for the latter purposes would be met out of Class C. For the making of pearl barley only Class C was sold. The same applies in respect of stock feed.

The production of Class D could not meet seed requirements, and this class was, therefore, sold for this purpose only. The shortage of Classes A and B are reflected by the following Table:—

Purpose.	Requirements.	Sold, Classes, A and B.	Sold, Class C
Beer-brewing.....	184,843	139,098	45,745
Yeast and Malt.....	20,114	17,269	2,845

Up to 31 August, the following quantities barley were sold (bags)—

Seed	29,071
Beer-brewing	184,843
Yeast and malt	20,114
Pearl Barley	34,093
Feed	185,456
	<u>453,577</u>

Of the 185,456 bags sold for feed, 134,500 bags were disposed of from 1 May 1945 (when the price was decreased). The increased purchases must be ascribed partly to the decrease in price, but mainly to the shortage of maize and the curtailment of maize rations, as well as to the drought in certain parts of the country. Below are the purchases of barley during the past three seasons:—

Province.	Season, 1942/43.	Season, 1943/44.	Season, 1944/45
Cape Province.....	205,870	285,318	426,107
Orange Free State.....	1,275	1,785	436
Transvaal.....	26,382	35,153	21,370
TOTAL.....	223,526	322,256	448,913

The big expansion in the production of barley is clearly reflected by the above figures. Then there is the increase in the production of feed barley, more particularly in the wheat area of the south-western Cape Province. There is no doubt that, but for the maize shortage, there would have been a surplus of feed barley this year. Since the price of feed barley was too high in relation to that of maize, and having regard, also, to the large increase in the production of this class, the Government decided, on the recommendation of the Wheat Industry Control Board, that as from the 1945-46 season the producers' price of feed barley (Class C) would be decreased from 15s. 6d. to 12s. 7d. per bag.

The prices of malt barley (Classes A and B) and Class D (barley-wheat) remain unchanged.

Oats.

The purchasing prices of oats were the same as those of the previous season, viz:—

Class A, grade one: 16s. per bag of 150 lb.

Class B, grade one: 15s. 6d. per bag of 150 lb.

The prices of the lower grades were fixed in proportion.

The basic selling price was raised by 1s. 5d. per bag, i.e. to 17s. 5d. and 16s. 11d. respectively. Of this, 5d. covered the agent's commission and 2d. that of the Board. The remaining 10d. was imposed to cover the loss entailed by the storage of the 252,000 bags carried over from the previous season (1943-44).

For the same reasons as in the case of feed barley, it was decided to decrease the price of oats for animal feeds as from 1 May 1945 by 2s. 5d. per bag, to 15s. 6d. and 15s. for grade one of Classes A and B respectively. The prices of the other grades were lowered in proportion. The loss will be made good in the same way as in the case of barley.

During the season the following quantities of oats were purchased (bags of 150 lb.):—

Class A	399,481
Class B	563,755

Carry-over from the 1943-44 season ...	963,236
	252,880

Total available 1,216,116 bags.

PRINCIPAL FOOD PRODUCTS.

Up to 31 August 1945, the following quantities of oats were sold (bags of 150 lb.):—

Seed	159,633
Breakfast foods	329,486
Feeds	418,352
Total	<u>907,471</u> bags.

The carry-over at the end of the season (31 October) is expected to be approximately 280,000 bags.

Of the quantity sold for feeds 305,000 bags were disposed of from 1 May 1945 when the price reduction came into force. But in this case, too there is no doubt that the increased sales are due mainly to the serious drought prevailing in certain parts of the country and to the curtailment of maize rations.

It has been pointed out above that the shortage of oats was changed into a surplus. A total of 252,880 bags was carried over from the 1943-44 to the 1944-45 season, and this in spite of the fact that rationing was lifted during the 1943-44 season, when it appeared that supplies of oats were adequate. This phenomenon must be ascribed to the enormous increase in the production as is reflected by the following figures:—

Province.	Purchases 1942/43. (bags).	Purchases 1943/44. (bags).	Purchases 1944/45. (bags).
Cape Province.....	307,315	297,405	619,542
Orange Free State.....	165,633	497,645	273,718
Transvaal.....	53,602	103,369	69,976
TOTAL.....	<u>526,550</u>	<u>898,419</u>	<u>963,236</u>

It should be borne in mind that the Orange Free State experienced an exceedingly unfavourable season, and had it not been for the serious drought which prevailed in that province during the autumn and winter of 1944, purchases in this province alone would have exceeded 1,000,000 bags during the 1944-45 season. The increase is attributable partly to the fertilizer shortage and partly to the fact that the price for oats was more profitable than that of wheat. Indeed, the expansion in the production of oats took place at the expense of wheat. Moreover, it appeared that the price of oats, like that of feed barley, was too high in relation to the price of maize for stock feeds. In view of the above, it was decided to decrease the producers' price of oats as from the 1945-46 season in order to bring it into proportion with that of maize.

In April, prices in respect of this product were also announced in advance, viz., that the prices to the producer for the 1945-46 season would be 13s. 1d. and 12s. 7d. for grade one of Classes A and B respectively, and the prices of the other grades in proportion.

Rye.

The purchasing price was the same as for the previous two years, viz., 23s. 6d. per bag of 200 lb.—the prices of the lower grades being in proportion. The selling price was 9d. per bag higher (6d. for the agent's commission and 3d. to the Wheat Industry Control Board). The price was increased by 3d. per bag per month as from 1 April, to cover storage costs.

The prices of rye flour and rye meal in wholesale quantities were fixed at 43s. 5d. and 38s. 1d. per bag of 200 lb. respectively, the prices of smaller packings and retail quantities having been fixed in proportion.

The minimum (wholesale) and maximum (retail) prices of first-grade rye bread, were 7d. and 8½d. per 2 lb.-loaf respectively; and for second-grade rye bread, 6½d. and 7¾d. respectively.

Rye is used for the following purposes:—

- (a) As seed for rye production and winter grazing;
- (b) in the form of rye flour for industrial purposes, as in the manufacture of matches, the manufacture of paste for book-binding, and the making of cardboard and paper containers;
- (c) in the form of rye flour and rye meal for rye bread and confectionery, and
- (d) as an animal feed.

It was decided to supply all seed and industrial requirements fully and to distribute the balance among bakers against a permit under a quota system, with a view to supplementing the wheat shortage. Only undergrade rye was sold as animal feed.

During the season, 136,858 bags of rye were purchased, as against 187,299 bags the previous year. The decrease is due mainly to the small crop produced in the Orange Free State, as a result of the drought.

In conjunction with the carry-over of 15,983 bags, there was therefore a quantity of 152,841 bags available for sale.

Up to 31 August 1945 rye sales were as follows:—

Seed	18,413
Milled for industrial purposes, bread and confectionery	124,252
Animal feed	9,966
Total	<u>152,631</u>

It was also decided to announce in advance the prices of rye for the coming season (1945-46), and to raise the producers' price by 1s 6d. per bag (the same increase as in the case of wheat). The present demand for rye for bread and confectionery is ascribable to the demand for a substitute for the standard loaf, and in the case of confectionery, for the greater part, to the limited quotas of sifted wheat meal received by bakers. As soon as white wheat bread is once again available, the demand for these purposes will largely fall away, and rye will once again, as in the past, be utilized chiefly as an animal feed in competition with maize. The prevailing price is too high to allow of this at present, since rye has approximately the same value as maize for feeding purposes. It is essential that these facts be brought to the notice of producers, who should be warned that the coming season will probably be the last during which they can expect the present price for rye, and that after this the price will have to be decreased to approximately that of maize. This fact was stressed when the prices of rye were announced in April, 1945.

Meat.

Since February 1945 the position with regard to the supply of slaughter stock to the controlled areas, especially in respect of cattle, has improved appreciably in comparison with the position during the

PRINCIPAL FOOD PRODUCTS.

previous few months. This is largely due to the fact that by that time producers understood the operation and advantages of the Meat Scheme better. In fact, the supply increased to such an extent that at times it exceeded the quota requirements of the controlled areas.

This position was further influenced by the serious drought, which caused a steady increase in the demand for permits. In the producers' own interest, it ultimately became necessary to refuse permits in some cases notwithstanding the fact that slaughtering was in full swing in all controlled areas in order that supplies could be kept for storage purposes and distribution among the public. Applications for permits from drought-stricken areas were accorded preference.

The price structure of slaughter stock for the 1945-46 season was fixed in the light of the experience gained during the previous year, mainly with the object of stabilising the industry and of endeavouring, in so far as possible, to ensure a regular supply of slaughter stock to the market. These are essential requisites to the success of the meat scheme, particularly in view of the fact that it is designed to be a long-term scheme.

Cattle.—During the 1944-45 season it became manifest that:—

- (a) The price margin between the grades ought to be smaller;
- (b) the price margin between the different controlled centres should be modified; and
- (c) it is essential to make provision for a seasonal price which would be higher during the months when the natural grazing is scarce or poor, and lower when the natural grazing is plentiful and good.

These amendments were deemed necessary to encourage producers to make provision for fodder for the months during which the natural grazing is insufficient for finishing their cattle.

With regard to the price margin between the different grades, it was found that a better price relationship would be obtained if the price margin between Super and Prime, Prime and Grade I, Grade I and Grade II, Grade II and Grade III, and Grade III and Grade IV, were 9s., 8s., 7s., 7s. and 14s. per 100 lb. respectively, instead of 8s., 9s., 7s. 6d., 8s. and 13s. respectively as was the case during the previous season under the Meat Scheme. The effect of these amendments on prices in the basic control centres for the various grades is reflected by the following comparison between the basic prices for 1944-45 and the modification introduced.

	Super.	Prime.	Grade I.	Grade II.	Grade III.	Grade IV.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Basic 1944/45 prices per 100 lb..	69 6	61 6	52 6	45 0	37 0	24 0
After introduction of modifications	69 6	60 6	52 6	45 6	38 6	24 6

The amended price basis for 1945-46 was announced on 7th May 1945.

It is evident that with the application of the amended inter-grade price margin, the price relationship between Grades II, III, and IV and specially Grade III has been improved, as compared with last year's prices of the other grades. This is to the advantage of producers in general, since more than half the cattle slaughtered last year were graded as Grade I, II and III.

Furthermore, it was found that a more regular supply of cattle to the controlled centres could be ensured by an amendment of the price margins between the controlled centres. Consequently, a price margin of 3s. was assigned for 1945-46 to Johannesburg, the Rand and Pretoria, instead of the 1s. per 100 lb. which was operative in respect of 1944-45, as against the basic control centres East London, Port Elizabeth, Kimberley and Bloemfontein; to Capetown 4s. per 100 lb. during April to December and 5s. per 100 lb. during January to March; and to Durban and Pietermaritzburg, 3s. per 100 lb. during the period July to November. This means that the centre margin of Capetown as against that of the basic centres was improved by 6d. per 100 lb. during April to December and by 1s. 6d. per 100 lb. during January to March; that of Johannesburg, the Rand and Pretoria by 2s. per 100 lb., and that of Durban and Pietermaritzburg by 3s. per 100 lb. from July to November.

Experience gained during the previous season showed that the seasonal price margin for periods when slaughter stock are plentiful or scarce should be 10s. per 100 lb. Consequently, it was laid down that for 1945-46 this seasonal price margin would be operative from 4 June 1945 to April, 1946 and that it would be increased fortnightly at the rate of 1s. per 100 lb. from 4 June 1945 to 8 October, 1945, when the seasonal peak of 10s. per 100 lb. above the commencing price would be reached. The price will then remain on this level until 2 December, after which a fortnightly reduction of 1s. per 100 lb. will be made until, in April 1946, the original commencing price is once again reached. This method of application of the seasonal price increase not only promotes the regular supply of slaughter stock to the controlled centres, but also ensures the necessary price stability to the industry throughout the season. Moreover, the advance announcement of prices enables producers to take timely steps to market their slaughter stock at the best time.

The seasonal price allowances during the 1944-45 season were not reduced to the level envisaged, after December 1944, and the full cycle of the seasonal price trend in that season was, therefore, not completed. In view of the price improvements for the 1945-46 season and the fact that these were introduced without prejudicing the consumer, it was decided to decrease the producers' price for cattle by 1s. per 100 lb. consecutively on 7, 14 and 21 May, before the prices of the 1945-46 season were to come into force. These reductions which altogether amounted to 3s. per 100 lb. were, however, on an average, smaller for the whole of May. Thus, although the commencing prices of slaughter cattle for the 1945-46 season were 3s. per 100 lb. lower than the closing prices of the 1944-45 season, it is expected that the price improvements introduced for 1945-46 will not only, on an average, be less than 3s. per 100 lb., but that the average seasonal prices for 1945-46 should also be higher than those for the previous season, provided the relationship between the monthly quantities of the various grades for the two respective seasons remains unchanged.

Sheep and Lambs.—Sheep and lamb prices for 1945-46 remain unchanged, except for certain amendments which were made with a view to effecting a better price relationship between the different grades and an amendment of the inter-centre price margin, with the object of securing a more regular supply of sheep and lambs to the various controlled centres.

In the case of sheep the inter-price margin between Super and Prime, Prime and Grade I, and Grade I and Grade II was fixed at

PRINCIPAL FOOD PRODUCTS.

1d., $\frac{3}{4}$ d. and 2d. per lb. respectively for 1945-46, as against $\frac{1}{2}$ d. 1d. and 2d. per lb. for 1944-45. In the case of lambs, the inter-price margins between Super and Prime, and Prime and Grade I were fixed at 1d. and $\frac{3}{4}$ d. per lb. respectively in 1945-46, as against 1d. and 1d. per lb. for 1944-45. These inter-grade price amendments mean that the prices for 1945-46 compare as follows with those for 1944-45 in the basic controlled centres:—

	SHEEP. (pence per lb.)		LAMBS. (pence per lb.)	
	1945/46.	1944/5.	1945/46.	1944/45.
Super.....	10 $\frac{1}{2}$	9 $\frac{7}{8}$	11 $\frac{1}{2}$	11 $\frac{7}{8}$
Prime.....	9 $\frac{1}{2}$	9 $\frac{3}{8}$	10 $\frac{3}{8}$	10 $\frac{7}{8}$
Grade I.....	8 $\frac{1}{2}$	8 $\frac{3}{8}$	10	9 $\frac{7}{8}$
Grade II.....	6 $\frac{1}{2}$	6 $\frac{3}{8}$	—	—

In the case of sheep the prices of Super, Grade I and Grade II were improved and only those of prime were slightly reduced. In the case of lambs the prices of Grade I are better, and those of Super and Prime slightly lower. The average price for the season should, however, be higher in both cases than that for 1944-45 since in so far as sheep are concerned, only about one-third of the slaughterings on the controlled market are Prime, while only roughly 40 per cent. of the lambs which are slaughtered are Super and Prime.

In regard to the inter-centre price margins it was stipulated that the price margins be altered as follows against the basic centres:—In the case of Durban and Pietermaritzburg the price margin was raised from $\frac{1}{8}$ d. to 1d. per lb.; in the case of the Rand, from $\frac{3}{8}$ d. to $\frac{1}{2}$ d. per lb.; and in the case of Pretoria from $\frac{3}{8}$ d. to $\frac{1}{2}$ d. per lb., while in the case of Cape Town (except in respect of Super lambs for which a price margin of $\frac{1}{2}$ d. per lb. was assigned) the price margin of $\frac{3}{8}$ d. per lb. was removed; the prices are the same as those of the basic controlled centres.

These increases in the centre price margins, except in the case of Cape Town, should make higher average prices for sheep and lambs possible in 1945-46 than in 1944-45.

Pigs and Goats.—No amendments were made in the prices of pigs and goats for 1945-46, except in the case of Grade I baconers in respect of which prices were raised from 11 $\frac{1}{4}$ d. to 12d. per lb. as from 6 July 1945 in order to encourage producers to supply more baconers than other types.

Calves.—In regard to calves, the institution of two grades was regarded as being in the interests of the industry. The prices for Grades I and II were fixed at 8d. and 6d. per lb. respectively dressed weight.

Two important Committees investigated certain aspects of the meat industry during the year—one, the question of cold storage facilities, the other, that of wholesale and retail butchers' prices. Their reports were submitted at the end of the report year and will be published.

Dairy Products.

The unfavourable weather conditions of 1944-45 exercised an adverse effect on dairy production, both as regards natural grazing and feed products. The fodder position was difficult during the summer months, and during the winter difficulties were also

experienced with feeds and grazing. In consequence of these factors the production of dairy products, particularly that of *butter*, was considerably lower than during 1943-44 which can also not be regarded as a particularly favourable season.

The production of *creamery butter* in the Union was approximately $4\frac{1}{2}$ million lb. less than in 1943-44, and that in South-west Africa, approximately 3 million lb. less, bringing the total quantity available for use to roughly 48,000,000 lb., i.e., almost 8 million lb. less than during 1943-44. Naturally, this necessitated the continuation of rationing through the trade. Drought conditions persist in many parts, with the result that since August the position has deteriorated still further and at present only one-third of the country's full requirements are available.

In the case of *cheese* the position is considerably more favourable, since, on the whole, conditions in the principal cheese-producing areas were somewhat better. During 1944-45 the consumption was approximately only 1 million lb. less than during the previous report year, and at present two-thirds of the Union's full requirements are available.

There continues to be a considerable shortage of *condensed milk*, although the production for 1944-45 is more or less the same as that of 1943-44. In pursuance of arrangements made by the Food Controller, 105,000 cases (approximately 4,400,000 lb.) of condensed milk were imported. The consumption of this condensed milk was subsidised by the State up to an amount of 3½d. per tin (or a total of £70,000). In addition, an agreement was reached with certain cheese-manufacturers to divert cheese-milk to condensed-milk factories during the months of September to December 1945; the subsidy involved amounts to £3,000. These measures led to a considerable increase in the quantity of condensed milk available for consumption in the Union.

Cost Investigations.—Arising from the unfavourable natural conditions of the past few seasons, representations were made by producers for higher prices for dairy products. The opinion was expressed that production costs had increased to such an extent as to make milk production unprofitable, and that producers were therefore not in a position to meet the country's requirements. Consequently, in April 1944, a Committee was appointed to inquire into the production costs of milk and the price relationship between fresh milk and factory milk. The Committee submitted an interim report in September 1944, and the Marketing Council was subsequently instructed to complete the investigation.

For this purpose the Marketing Council had at its disposal the evidence given before the Committee, as well as cost surveys made by the Division of Economics and Markets in various parts of the country for the season 1943-44 and 1944-45.

For the 1944-45 season the Division of Economics and Markets collected cost data from a comparatively large number of farms in Griqualand East and the eastern Free State where cheese-milk is produced. A similar survey was also made in respect of the 1943-44 season, but the number of farms visited was inadequate. In various other areas visited, milk production, for the greater part, constitutes a subordinate branch of the farming concern, with the result that serious difficulties were experienced in the allocation of costs between the various branches of the farming concerns. For the same reason, it was also impossible to obtain satisfactory production-cost figures in regard to cream. In the circumstances, the Marketing Council confined itself to production costs for

Griqualand East and the eastern Free State as being the most reliable, although the data even for these areas were subject to certain shortcomings. The average net production costs of cheese-milk on the farms visited in the two areas, amounted to 9d. per gallon, including interest on capital at 5 per cent., but excluding any compensation to the farmer himself for his own labour and management. If to this is added operator's earnings of 2d. per gallon, a sum named as reasonable by several witnesses before the Dairying Costing Committee, the average costs amount to 11d. per gallon. Since Griqualand East and the eastern Free State are representative of the better and more intensive dairying areas in the Union, it was generally accepted that the costs in those areas could be taken as basis for the industry. On the recommendation of the Dairy Industry Control Board the Marketing Council agreed, however, that since the industry has now had to contend with unfavourable conditions for two successive seasons, prices should be fixed at slightly more than 11d. per gallon.

In its report, however, the Marketing Council also emphasise the fact that the yield per cow in the dairy industry is very low compared to the yield in most other countries in which dairy products are produced, and that the comparatively high production costs are in a large measure due to this. Improvement of the quality of dairy cows and, perhaps even more, of the standard of nutrition, is of the utmost importance to the future development of the industry.

Prices for 1944-45.—As from 1 November 1944, the price of cheese-milk was fixed as 9½d. per gallon and that of butterfat at 1s. 9d. per lb. Owing to drought conditions which prevailed during December and January, however, it was decided to advance the winter premiums which normally are not commenced before May, as from 1 February 1945, at the rate of 3d. per lb. butterfat and 1d. per gallon cheesemilk.

On 1 May the usual premiums came into force, viz. 3d. per lb. butterfat and 2d. per gallon cheese-milk for May and June, and 7d. per lb. butterfat and 2½d. per gallon cheese-milk for the period July to October. The prices of condensed milk were consistently maintained at 1d. per gallon above those of cheese-milk. These prices denoted an average producers' price of 24d. per lb. butterfat and 11d. per gallon cheese-milk over the season as a whole.

The retail price of butter was maintained at 2s. per lb. first grade from 1 November 1944 to 30 April 1945, and since then at 2s. 1d. per lb. To accomplish this, the Government contributed a subsidy of £320,000. The retail price of first-grade cheese was fixed at 1s. 8d. per lb. as from 1 November, and at 1s. 8½d. as from 16 February 1945. In this case no subsidy was necessary.

For the 1945-46 season the basic price of cheese-milk was fixed at 10½d., and it is intended to pay winter premiums at the rate of 2d. in June, 2½d. during the four months July to October, and 2d. in November in the event of conditions being unfavourable during that month. In the case of butterfat the basic price was fixed at 23d. per lb., and winter premiums at the rate of 4d., 7d. and 4d. during the month of June, the period July to October and the month of November respectively.

It will be observed that the payment of the winter premiums was deferred a month, while November, which had formerly been regarded as a summer month, will count as a winter month if circumstances warrant it. The change was recommended by the Marketing Council and met with the general approval of the Dairy

Industry Control Board, since during May, production is usually still on a high level in the more western areas which derive more benefit than the eastern and more intensive areas if premiums are already paid during that month.

This price fixation is designed to ensure an average price of slightly more than 11½d. per gallon of cheese-milk and approximately 2s. 1d. per lb. butterfat over the season as a whole.

The consumers' price of cheese was raised by ½d. per lb. to 1s. 9d. (first grade) and that of butter to 2s. 2d. per lb. (first grade). The Government will make an estimated contribution of £320,000 in respect of butter.

Margarine.

The reorientation and expansion of the dairy industry with a view to the production of a far greater quantity of dairy products than at present, is one of the primary objects envisaged in regard to the future development of agriculture in South Africa. The Department's policy in connection with fodder crops and stock feeds, coupled with the grazing position in many areas, presages a favourable development for the dairy industry, particularly if extensive improvements are effected in regard to systems and methods of farming, etc. Although in the past dairy farmers regarded the manufacture of margarine with suspicion, the majority now realized that the greatly increased demand for products containing essential fats, need not jeopardise their position, and, moreover, that a prosperous oil-expressing industry will be to their advantage, since it will ensure appreciable supplies of protein feeds at low prices.

Arising from the sharp increase in the sharp demand for protective foods such as butter and cheese—a feature which is very welcome indeed, inasmuch as it envisages the elevation of the nation's nutrition level and, more particularly, that of the lower income groups—it is clear, however, that the dairy industry alone cannot meet the country's full requirements of essential fats. Consequently, the whole question of the manufacture of vitaminised table margarine in the Union was carefully investigated, and the Government decided to allow its manufacture. Margarine has, of course, been produced in the Union for some years past but, until recently, not for food purposes.

Regulations in connection with the manufacture of table margarine were promulgated during the year. Certain firms were licensed to manufacture fixed quantities of margarine during 1945 and make it available for distribution among the lower income groups of our population.

In order to control the position effectively and protect the interests of all parties concerned, three cardinal principles of policy were laid down by the Government, viz:—

- (a) that the quantities of margarine which may be manufactured and the firms who are allowed to produce these quantities be fixed by the Government itself;
- (b) that wholesale distribution by the Dairy Industry Control Board be controlled, and that direct distribution to the lower income groups be carried out by the Department of Social Welfare; and
- (c) that the technical supervision over the manufacture of the product be carried out by the Division of Dairying of the Department

The firms licenced in accordance with this policy are allowed jointly to manufacture a maximum quantity of 7,000,000 lb. of margarine.

rine, during the first year. This quantity will later be increased to 12,000,000 lb.

Up to the present, these firms, with the exception of one Cape Town firm, which produces only an interim product on a small scale, have not yet reached the production stage. All possible assistance is given by the State in connection with the importation of the necessary machinery and raw materials. The latter, in particular, are difficult to procure in view of the world-wide shortage of seeds. Margarine is not likely to be available before the second half of 1946.

Eggs.

The Egg-Purchasing Scheme, which was introduced during 1942, was once again put into operation during the past year, in order to effect regular distribution of eggs throughout the year.

At the end of August, 1944, the purchasing of eggs under the scheme, for cold storage, was recommenced with the object of selling the eggs held in storage during the period of scarcity. The monthly egg supplies were, however, much smaller than those of the previous year. During the 1943-44 season there was, at the end of the months of November, December, January and February, when the bulk of the eggs were in cold storage from month to month, an average of 131,000 cases of 30 dozen each in cold storage, as compared with an average of only 66,000 cases for the corresponding months of the 1944-45 season.

In view of the fact that the egg supply fluctuated in the trade according to the laying season, and since production costs are higher in the late summer months, the maximum wholesale prices for this year were modified from time to time. For grade I, large, for example, they were fixed as follows:—

July, 1944.....	1s. 7d.
4 November 1944.....	1s. 9d.
17 November, 1944.....	2s. 3d.
29 December, 1944.....	2s. 7d.
2 February, 1945.....	2s. 10d.
2 March, 1945.....	3s. 1d.
6 April, 1945.....	3s. 8d.
20 July, 1945.....	1s. 7d.

The other grades were fixed in proportion.

The retail prices were fixed accordingly, with due allowance for a price margin between wholesalers and retailers. On 2 February, 1945, the maximum wholesale and retail prices of chilled eggs were also fixed. In the case of grade I the fixed prices for the wholesale and retail trade were 2s. 4d. and 2s. 7d. per dozen, respectively.

The egg supplies for the 1945-46 season, which apparently started coming in earlier this year, were more or less the same as during the previous year. Since, however, the meat supply position had improved, consumption of eggs decreased in comparison with last year, with the result that up to the first half of November 1945, the Food Controller purchased more eggs for storage than was the case last year. Other factors, however, came to the fore. In view of the scarcity and high prices of poultry feeds, the prices of grade I, large, had already been increased from 1s. 7d. to 1s. 9d. per dozen as from 28 September 1945. In this connection it must be pointed out that producers enjoyed an advantage of 2d. per dozen during October, which was not the case last year, when the first price increase did not come into force before November.

Further prices will be announced for the rest of the season, but it is intended to revert to last years prices as from the beginning of January 1946.

Potatoes.

The potato crop for the past year was again relatively poor, although the total yield was better than that of the previous year, the estimate for this year being roughly 2,500,000 bags, as compared with 2,155,000 bags last year. In this respect, too, the unfavourable climatic factors made themselves felt and the crop, which is always susceptible to weather conditions, remained sub-normal, as regards both quality and quantity. The quality was particularly poor in the case of the summer crop, and the early and cold winter caused considerable damage to the late potatoes in the lowveld.

Fixation of maximum prices was continued in the interest of producers and consumers alike. On 11 August, 1944, the prices for the winter season were fixed. These prices were operative up to 24 November, 1944, when prices were fixed for the summer season. The following table reflects the prices fixed for the two periods:—

	Fixation on 11 August, 1944. (per bag of 150 lb.)	Fixation on 24 November, 1944. (per bag of 150 lb.)
	s. d.	s. d.
Farm price.....	33 6	30 0
Market price.....	36 0	32 6
Wholesale price.....	37 6	34 0
Consumer's price.....	38 0	34 6
	(or 3½d. per lb.).	(or 3d. per lb.).

On 31 July, 1945, compulsory grading was instituted on the 9 leading markets of the Union. This marked an important milestone in the marketing of potatoes. Prices were fixed according to grades and classes. For grade I the producers' price was fixed at 30s. per bag, for grade II at 26s. 6d. and for grade III at 22s., while market and agents prices were raised from 2s. 3d. to 2s. 6d. The consumers' prices were fixed at 9d. 8d. and 7d. for 3 lb. of the respective grades. It stands to reason that, being an innovation, compulsory grading gave rise to certain difficulties. These will, however, gradually be smoothed over, and in the long run the system will be to the advantage of the entire industry.

The consumption of potatoes also increased considerably, and as in the case of other crops, it is hoped that production will also increase. Climatic conditions during the coming year will be the deciding factor.

Vegetables.

The demand for vegetables continued to be high, not only because vegetables are beginning to occupy a more prominent place in the diet of a larger section of the population, but also because the shortage of other foodstuff compelled consumers to utilize more vegetables.

In the case of vegetables too, the drought prevented maximum production but since the production centres are fairly well distributed over the country and in view of the large diversity of vegetables, substitution could be carried out to a considerable extent, and during most of the year the consumer could at least obtain reasonable

PRINCIPAL FOOD PRODUCTS.

quantities of certain vegetables. True, there were periods of scarcity in some centres, depending upon the fluctuations caused by climatic factors, but no general scarcity was experienced over long periods.

The following figures indicate the sales of seven of the most important vegetables (excluding potatoes) for the 8 months ended 31 August, on eight of the Union's leading markets:—

Cauliflower.....	69,461,000 lb.
Cabbage.....	338,815,000 lb.
Green beans.....	113,665,000 lb.
Green peas.....	107,092,000 lb.
Tomatoes.....	540,825,000 lb.
Onions.....	346,716,000 lb.
Sweet potatoes.....	200,460,000 lb.

On the whole, prices remained on the same level as those of the previous year, except that in the case of increased sales lower prices were fetched and in the case of reduced sales a rising trend was evinced—the usual effect of demand and supply on price. Prices of green beans and green peas were high throughout the year. On the other hand, prices for sweet potatoes evinced a declining tendency, notwithstanding a smaller crop.

Groundnuts.

The crop was very disappointing and is estimated at only 120,000 bags. Actually, there is a very big shortage and for some time past the Food Controller has been making every effort to import groundnuts. Up to the present, no particular success has been achieved in this direction. Import permits were issued to several dealers, and also to the “Waterberg Landbouers Koöperatieve Vereniging”, but in so far as has been ascertained, few succeeded in securing any quantities worth mentioning.

Except for roughly 5,000 bags withheld by the “Waterberg Koöperasie” for seed, all groundnuts, shelled and unshelled, were sold for human consumption and sweet-manufacturing purposes. It was, however, impossible to meet the demand. No local groundnuts could be made available for oil-expressing purposes.

Producers received £1. 8s. 3d. per bag for unshelled groundnuts, in comparison with £1. 5s. 0½d. per bag last year. Selling prices were as follows for the two years:—

Groundnuts sold for:—	1944. (per 100 lb.).	1945. (per 100 lb.).
	s. d.	s. d.
Sweets (shelled).....	52 0	60 0
Other (shelled).....	42 0	(for seed only)
3-4 kernels (unshelled).....	32 6	38 0
Other (unshelled).....	28 0	33 0

In collaboration with the “Waterberg Koöperasie”, a seed-loan scheme was again established for stimulating the production of groundnuts. Under the scheme, treated seed was supplied by the abovementioned “Koöperasie” at 102s. per bag of 200 lb. to members, and 107s. per bag to non-members. The scheme applied to a large number of districts in the Transvaal and Natal where groundnuts can be successfully grown. The quantity of seed was, however, insufficient to meet the needs of all applicants, but the scheme will undoubtedly stimulate production, if conditions are favourable.

Citrus Fruit.

The 1944-45 citrus crop was estimated at 6,348,112 boxes of fruit of export quality, and of this, 981,851 boxes were exported. The 1945-46 crop is estimated at 5,000,000 boxes of export quality and of this, 2,481,284 boxes of oranges and 275,217 boxes of grapefruit were exported. During the present season exports were once again made to Sweden, for the first time since the outbreak of the war, the quantity amounting to 76,000 boxes of oranges. Approximately 60,000 boxes were sold to ships and consigned to a few territories along the East Coast. The entire balance was exported to Britain.

During 1939 the citrus crop was estimated at 5,800,000 boxes of export quality and of this, 4,646,000 boxes (or 80 per cent.) were exported. During the 1945 season less than 50 per cent. of the crop was exported, the balance being sold locally. The expansion of the local consumption of citrus fruit, particularly of oranges, is partly attributable to the increased purchasing power under present conditions, but it is also largely due to the special attention given by the Citrus Board during the past five years to the local markets. Not only do citrus producers derive a better income from the sales on the local market, but normally the consumers are also assured of adequate supplies at reasonable prices. Price fixation and co-ordinated distribution to all markets, small and large alike, met with much success, and the Board intends continuing with this policy during the post-war period.

In this connection it will be necessary, however, to effect certain changes in local price relationships. During the war years there was a surplus of citrus fruits and the prices for the local market were purposely fixed at a low level in order to ensure the maximum consumption of citrus fruit. At the fixed wholesale prices which were in force during the present season, the average gross selling price for citrus fruit consumed in the form of fresh fruit was about 2s. 9d. per pocket. After deduction of all the costs incurred from orchard to market, the grower received about 1s. 7d. per bag for his fruit, and this must provide him with a livelihood and cover all his farming expenses. Local market prices will, therefore, have to be raised somewhat in order to provide the grower with a little more profit. The prices will be fixed according to grades and in future citrus fruit of export quality will be available for local markets too.

The 1945 citrus crop suffered considerable damage as a result of the drought in various parts of the Union and the 1946 crop will also be adversely affected.

During the war years the Citrus Board carried out its activities under various war measures. The powers vested in it by these measures will lapse in the near future, and attention is now being given to the institution of a comprehensive scheme under the Marketing Act to govern the future activities of the Board.

In consequence of the low prices in the Union and the limited quantity of citrus fruits exported during 1944, the producers of citrus for export derived an average income of about 2s. 3d. per box; a subsidy of 14d. per box of fruit of export quality was paid to growers who produced less than 25,000 boxes and, in the case of a production of not more than 50,000 boxes, on the first 25,000 boxes. Altogether, growers received approximately £200,000 in subsidies in respect of their 1944 crop. In view of the increased exportation during the 1945 season, a reasonably good average income will be obtained this season.

PRINCIPAL FOOD PRODUCTS.

Deciduous Fruit.

During the 1944-45 season it was again impossible to export deciduous fruit, and consequently the Government, as in 1943-44, contributed a sum of £280,000 towards the maintenance of the industry. In addition, a Land Bank loan to an amount of £750,000 was made available to the Board in order to finance the scheme. The scheme for 1944-45 differed from those in respect of previous seasons, however, in that price fixation was instituted for the trade and consumers, while the Deciduous Fruit Board also sold at fixed prices. The price fixation was designed to ensure for producers more or less the same net prices as in 1943-44, with slight improvements in respect of certain classes and grades.

The production of grapes, plums and peaches was lower in 1944-45 than in 1943-44, while the pear crop, on the other hand, was considerably bigger. There was, however, a slight increase in the quantities marketed fresh, and a decrease in the quantities destined for preservation. Consequently, the Board was in a position, by means of an arrear payment, to ensure to producers the full prices envisaged.

The quantities of fresh fruit sold by the Board on the various markets, to the Departments of Social Welfare and Defence and to factory workers, are as follows:—

	1943-44. (tons).	1944-45. (tons).
Peaches.....	1,325	918
Plums.....	1,951	1,250
Pears.....	2,126	4,367
Grapes.....	117,579	118,102
TOTAL.....	22,999	24,637

In addition to the abovementioned quantities, 4,309 tons of grapes were sold by producers with the Board's approval, either directly or in execution of private orders; the figures for 1944-45 were 5,090 tons.

The quantities sold to canning factories or processed by the Board itself, are as follows:—

	1943-44. (tons).	1944-45. (tons).
Plums.....	5,262	5,192
Pears.....	11,846	13,676
Grapes.....	24,934	19,039
TOTAL.....	42,042	37,907

The total quantities handled were, therefore, as follows:—

	1943-44. (tons).	1944-45. (tons).
Peaches.....	1,325	918
Plums.....	7,213	6,442
Pears.....	13,972	18,043
Grapes.....	46,840	42,231
TOTAL.....	69,350	67,634

More or less the same scheme was put into operation for the 1945-46 season. Producers' prices were left unchanged, except in the case of pears, in respect of which an increase of 10s. per ton was introduced, while a few minor adjustments also appeared necessary. Thus, eg., the price of Bon Chretien pears was slightly increased to be more in line with those of other pear varieties, while in the case of grapes, "selected" and "choice" grades (equivalent to first-grade and second-grade) were combined, since there was a marked tendency during the previous season to market all grades at the maximum price. Consumers' prices remain unchanged, however, except that the maximum retail price for grapes has now been fixed at 6d. per lb., in comparison with 7d. and 5½d. per lb. for first and second grade respectively, last season.

Further, the Government's contribution for the 1945-46 season was decreased from £280,000 to £230,000. It is expected that the Board will be able to effect appreciable savings by disposing of a still greater percentage of the fruit crop in the fresh form than during the previous season. There is also a possibility that exports will be recommenced, but on a small scale.

In these circumstances it is confidently expected that the Board will be in a position to pay out, at the end of the season, the full 20 per cent. of the envisaged prices which are being temporarily withheld.

Dried Fruit.

The total production figures for the past eight years (1937-1944) are as follows:—

1937.....	28,858,842 lb.
1938.....	26,015,636 lb.
1939.....	26,553,252 lb.
1940.....	32,875,276 lb.
1941.....	25,489,523 lb.
1942.....	37,657,175 lb.
1943.....	36,440,099 lb.
1944.....	36,973,781 lb.

During the 1945 season approximately 19,000 tons of dried fruit were produced, compared with 18,500 tons in 1944, and this is even slightly in excess of the bumper crop of 1942. While the production of sultanas is appreciably lower than in 1944, the total production of dried vine fruits is approximately 1,300 tons higher. The production of dried pears increased by over 400 tons, mainly as a result of the activities of the Deciduous Fruit Board. On the other hand, the production of apricots, peaches, and especially prunes, is appreciably lower. The total production of dried tree-fruits is almost 800 tons less than in 1944. The production of dried vine fruits represents 77 per cent. of the total.

Raisins and apricots are the only dried fruit products of which a surplus was produced in 1945. Owing to the gradual increase in demand, both in the Union and in adjoining territories, the surpluses during the past year decreased and this year only approximately 2,400 tons of raisins and 218 tons of apricots were sold to the British Ministry of Food by the Deciduous Fruit Board, as compared with 3,295 tons of raisins and 340 tons of apricots in 1944.

In 1944, 750 tons of sultanas were exported, while this year, in consequence of the smaller balance and the increasing demand, there was no surplus. The other types of dried fruits were all comparatively scarce, particularly in the case of prunes, in respect of which

PRINCIPAL FOOD PRODUCTS.

the Board was obliged to freeze all supplies in the hands of packers and to regulate the marketing thereof.

During 1945 the Dried Fruit Board once again established pools in respect of raisins, apricots (fresh and dried), sultanas and currants, and all these types of dried fruit had to be sold to the Board at fixed prices. In the case of the apricot, sultana and currant pool, slight or no export losses were sustained, owing to the higher local consumption and smaller crops, and consequently there is an appreciable surplus which will be paid out to producers as an arrear payment, which means that, generally speaking, they will obtain considerably better prices than in 1944. In the case of the raisin pool, on which a loss is usually suffered which is made good by the K.W.V., the shortage should be considerably smaller. The average advance payment on raisins to producers was, however, increased slightly at the beginning of the season.

Producers' as well as consumers' prices in respect of all other kinds of dried fruit (with the exception of special dried vine fruits) have also been fixed since 1944, and according to present indications this policy will be continued for the coming season. The Board will also again take over full control and establish pools in respect of raisins, apricots, sultanas and currants. It is proposed to maintain the prices for the 1946 season at more or less the same level as those for 1945.

During the past four years (1941-44) a gradual rise took place in producers' prices for dried vine products. Below are the comparative figures:—

	5. d. per lb.	4. d. per lb.	3. d. per lb.	2. d. per lb.	1. d. per lb.
1941—					
Raisins.....	—	3 ¹³ / ₁₆	2 ¹ / ₂	1 ¹ / ₂	13 ¹ / ₁₆
O.R. Sultanas.....	2 ³ / ₄	2 ¹ / ₂	2 ¹ / ₂	2	15 ¹ / ₁₆
W.P. Sultanas.....	—	2 ⁷ / ₁₆	2 ³ / ₁₆	1 ⁷ / ₈	15 ¹ / ₁₆
Currants.....	3 ¹ / ₂	3 ¹ / ₁₆	2 ¹ / ₈	—	—
1942—					
Raisins.....	—	4	3 ¹ / ₂	2 ¹ / ₈	3 ³ / ₈
O.R. Sultanas.....	3 ⁵ / ₈	3 ¹ / ₈	2 ³ / ₄	2 ¹ / ₄	2 ³ / ₈
W.P. Sultanas.....	—	3	2 ¹ / ₂	2 ¹ / ₈	1 ¹ / ₂
Currants.....	4	3 ⁵ / ₈	2 ³ / ₈	—	—
1943—					
Raisins.....	—	4 ¹ / ₄	3 ⁵ / ₈	2 ¹ / ₂	7 ⁷ / ₈
O.R. Sultanas.....	3 ⁷ / ₈	3 ³ / ₈	2 ¹ / ₄	2 ¹ / ₄	1
W.P. Sultanas.....	—	3 ¹ / ₂	2 ¹ / ₄	2 ¹ / ₄	1
Currants.....	6	5	4	—	—
1944—					
Raisins.....	—	4 ¹ / ₂	3 ⁵ / ₈	3 ¹ / ₂	2 ³ / ₄
O.R. Sultanas.....	4	3 ³ / ₄	3	2 ¹ / ₂	1
W.P. Sultanas.....	—	3 ¹ / ₄	3	2 ¹ / ₂	1
Currants.....	6 ¹ / ₂	5 ¹ / ₂	4 ¹ / ₂	—	—

In order to promote the effective application of the price differences introduced between the various grades of dried fruits, in respect of producers as well as the trade, and in this way to encourage better cultivation and, therefore, also to obtain better quality in the interests of consumers, grading and packing regulations in respect of all dried fruits were recently promulgated under the Marketing Act. It is hoped that better grading, coupled with healthy price differences between grades, will lead to a decrease in the production of the poorer qualities. Finding a market for these poorer qualities usually presents a problem.

Wine and Brandy.

The expansion of wine production during the past years is shown by the following production figures in respect of distilling wine:—

<i>Year.</i>	<i>Leaguers— 20% strength.</i>
1919.....	114,128
1929.....	159,722
1939.....	290,308
1943.....	440,788
1944.....	509,792
1945.....	411,890

The production for 1945 was not so high, owing to drought and heat during the critical summer months. A very dry and hot late summer exercised a deleterious effect on the crop in almost all wine districts, except at places where irrigation was possible. The hot weather during the wine-making season was, unfortunately, also unfavourable for the production of wine of outstanding quality.

The increase in production cannot serve as a criterion, however, by which to judge the sound development of the industry. On the contrary, over-production in the wine industry must constantly be guarded against. Fortunately, this fact is appreciated, on the whole, and steps are being taken to prevent unhealthy expansion. The Act of 1940 makes provision for placing every producer on a quota basis and instituting control over production. This matter is already receiving the attention of all interested parties. In order to prevent an increased wine production, a large quantity of grapes is, for example, being converted into raisins, and this practice is stimulated by a subsidy payable by the K.W.V.

Fortunately, the increase in production during the war years was accompanied by a rapid increase in consumption. It would appear, however, as if the peak was reached in 1943, as is reflected by the following figures for the consumption of brandy and spirits:—

<i>Year.</i>	<i>Proof gallons.</i>
1919.....	1,517,074
1929.....	891,219
1939.....	1,238,375
1943.....	2,646,779
1944.....	2,588,707

The prices to wine dealers, of standard distilling wine—strength 20 per cent.—were left unchanged at £9. 10s. 6d. per leaguer for 1944 as well as 1945. For 1945 the wine-farmer received £5. 16s. 5d. per leaguer of 20 per cent. standard strength, as compared with £5. 10s. 4d. in 1944 and £5. 0s. 6½d. in 1943. Prices of good wine were raised from £7. to £7. 10s. per leaguer and those of quality wines from £11 to £11. 10s.

The war is over and consumption is beginning to decrease. Reference has already been made to the danger of over-production. This is, however, not the sole factor to which attention must be given. If we wish to compete on the export market, very serious attention must also be paid to quality. New export regulations were promulgated in December, 1944, to improve the position in this connection. We can never hope to compete with other viticultural countries unless our products are of the desired quality. In particular, we should guard against losing the markets which we built up during the war years in certain African States.

IV. Other Agricultural Products.

A PART from the food products already discussed there are also some other important products, chief among which is wool, which merit discussion. The most salient features in regard to these products are outlined in this chapter.

Wool.

The quantity of wool produced in the Union shows a decrease of approximately 50,000 bales on the previous year's clip. This is due mainly to drought in important sheep-breeding areas, and also to the fact that some erstwhile wool-farmers are now devoting themselves to other branches of the agricultural industry.

Earlier in the year a successful meeting of the Board of Management of the International Wool Secretariat was held to discuss matters appertaining to propaganda and research in connection with wool.

By far the most important event of the year for wool producers, however, was the agreement reached in regard to the post-war marketing of wool.

During April and May, delegates from Australia, New Zealand and South Africa and also representatives of the British Government met in London, with a view to drafting schemes for the disposal of the accumulated wool surplus, together with future clips, on an effective basis. While the clips annually exported by the three Dominions is estimated at 1,444 million lb. of wool in the grease, 3,245 million lb. of wool from the Dominions remained unsold during the war years. The accumulated supplies are, therefore, equivalent to more than two normal clips, and the absence of a systematic selling policy would not only have entailed financial loss in the disposal of the surplus, but as long as the surplus existed, new clips would have been subject to uncontrolled price influences.

The conference recommended to the Governments concerned that a Joint Organization be established to regulate the marketing of the surplus stocks together with the new clips at a reserve price to be fixed by the relative Governments. It is estimated that 12 or 13 years will elapse before all surpluses are wiped out.

After consultation with the Wool Council and the Executive Committee of the National Wool Growers' Association which unanimously approved of the proposed regulations in regard to the price-stabilization scheme, the Union Government adopted the recommendations of the Conference. The present time is not opportune for explaining and discussing the post-war scheme. The complete report of the Conference, which is now in press, will shortly be available and the necessary legislation for carrying into effect the recommendations of the Conference will be submitted during the coming Parliamentary Session.

Mohair.

During the 1944-45 season, 8,484 bales of mohair were received, as against 10,120 bales last season, denoting a decrease, therefore, of 1,636 bales.

The drought also had an adverse effect on the mohair clip. The average weight per bale is 502 lb. as against 514 lb. per bale the previous season. Both the sold and unsold stocks were higher at the end of the season than those of the previous season. The sold stocks amounted to 23,767 bales and the unsold stocks to 4,336, in comparison with 20,900 and 2,330 bales, respectively.

Exports amounted to roughly 3,000 bales less than last season. The fact that the export value was 21·0d. per lb. as against 15·6d. per lb. the previous season shows, however, that better types were exported. It is expected that the sales and exports will improve during the coming season. The British Government has lifted the importation ban on mohair, and this step should stimulate the mohair market.

Hides and Skins.

On the whole, the market for hides and skins remained very firm, with a buoyant tendency.

On 3 November, 1944, the maximum prices were fixed for sun-dried or dry-salted hides, wet-salted hides and newly flayed hides, and on 15 May 1945, the maximum prices of dry-salted and sun-dried hides were fixed as follows:—

MAXIMUM PRICES PER LB. EX-WAREHOUSE (HARBOURS).

Description of Hides.	Firsts.	Seconds.	Thirds.	Fourths.
	d.	d.	d.	d.
(1) Dry-salted: Below 6 lb.....	13	12	8	6
6 lb., up to but not including 10 lb....	11½	10½	6½	5
10 lb. up to but not including 20 lb....	9½	8½	7½	6
20 lb. up to but not including 30 lb....	8½	7½	6½	5
30 lb. and over.....	7½	6½	5½	4
(2) Sun-dried: Below 15 lb.....	10½	9½	7½	5
15 lb. up to but not including 25 lb....	9½	8½	6½	4½
25 lb. and over.....	8½	7½	5½	4

In the case of sheep- and goatskins it was found necessary to fix, on 20 July, 1945, the maximum prices of dry coarse-woolled sheepskins (excluding coarse and coloured) and dried goatskins (excluding angora skins) in respect of different types, weights and for the various ports.

On the Port Elizabeth market the average monthly prices of firsts and seconds sun-dried and dry-salted hides, from September, 1944 to August, 1945, remained unchanged.

The following are the average monthly prices per lb. for both types.—

<i>Sun-dried.</i>		<i>Dry-Salted.</i>	
<i>Firsts.</i>	<i>Seconds.</i>	<i>Firsts.</i>	<i>Seconds.</i>
d.	d.	d.	d.
8½	7½	9½	8½

During July and August, 1945, the prices of sheepskins were, on the whole, the highest since the outbreak of the war. In September, 1944, the monthly average prices per lb. at Port Elizabeth for merino sheepskins with extra long wool, long wool, medium and short wool were 9·75d., 6·84d., 5·42d. and 3·58d. respectively, as against 11·50d., 9·46d., 8·44d. and 7·58d. respectively for August, 1945. The monthly average price for sound coarse-woolled skins was 8·97d. per lb. for September, 1944, as against

10·69d. per lb. for August, 1945, while that of sound angora goatskins was 8·69d. per lb. for September, 1944, as against 10d. per lb. for August, 1945.

The total weight of hides and skins exported during the year amounted to roughly 34,000,000 lb. compared with approximately 28,000,000 lb. the previous year.

A discouraging feature is that, despite propaganda on the part of the Department, the Hides and Skins Advisory Board, and bodies such as the Anti-Waste Organization, very little progress has as yet been made by the majority of farmers and butchers with regard to the methods of slaughtering and curing of hides and skins. The existing regulations for the improvement of the quality of hides in the trade had a beneficial effect, and since these regulations were instituted under the emergency regulations, it is trusted that they will be made permanent when the emergency regulations are lifted.

Tobacco.

The receipts of Virginia tobacco for 1944 were 23,500,000 lb. Of this, 15,300,000 lb. were air-cured and 8,200,000 lb., flue-cured. The Turkish tobacco crop amounted to 533,000 lb. For 1945 the total tobacco crop is estimated at 34,000,000 lb. made up as follows:

Virginia tobacco, flue-cured.....	14,300,000 lb.
Virginia tobacco, air-cured.....	19,600,000 lb.
Turkish tobacco.....	700,000 lb.

Notwithstanding the drought in certain parts, and hampering factors such as scarcity of labour and fertilizers, the year was favourable in the most important tobacco-producing areas, as is shown by these figures. Not only was production considerably increased, but there was a particularly encouraging increase in the flue-cured class.

During 1944, a total amount of 30,100,000 lb. of all classes and types of tobacco was processed in the Union. Since the local production was too small to meet the demand, the duty-free importation of 10,000,000 lb. and 400,000 lb. was allowed from Southern and Northern Rhodesia, respectively.

Once again an increase of 5 per cent. in producers' prices was introduced, i.e., the basic price has now been increased to a plus 45 per cent. for the Virginia types. Since 1939-40 the selling prices of the agents of the Board have been increased as follows:—

	1939/40. (pence per lb. leaf tobacco.)	1944/45. (pence per lb. leaf tobacco.)
Flue-cured.....	17·68	28·53
Light air-cured.....	11·64	20·82
Dark air-cured.....	7·27	12·70
Air-cured average.....	8·93	15·92

In so far as Turkish tobacco is concerned, no price fixation was made and prices were regulated by the relative co-operative societies and manufacturers among themselves. After a slack period of considerable duration, the Turkish-tobacco Industry in the Western Cape Province is experiencing a revival, which bodes well for the adaptation of this industry to the farming systems of that area.

Chicory.

During the two years 1943-44 and 1944-45, the following quantities were received by the Chicory Control Board:—

Chicory.	1943/44.	1944/45 up to 17/9/45.
	lb.	lb.
Grade 1.....	3,212,000	4,973,000
Grade 2.....	2,440,000	557,000
Grade 3.....	837,000	97,000
Ungraded.....	—	217,000
TOTAL.....	6,489,000	5,885,000

A further 500,000 lb. is expected before the end of the Board's financial year.

This year's crop was obtained from seed, part of which was imported and the rest locally produced by the Department. During the year, 8,900 lb. of seed were sold and for the following year, 12,000 lb. of seed were ordered from overseas alone. As regards this year, all the chicory produced was taken up by the trade, and the shortage of supplies was such that coffee-mixers had to work on a basic mixture of 10 to 15 per cent. instead of the desired 25 per cent.

Since last year, a bigger differentiation has been made between the prices of the three grades, with a view to quality improvement. Prices for the following year were fixed on the same basis, viz., 35s., 30s. and 25s. for the three grades, respectively.

V. Co-operative Societies.

DURING the past year the co-operative movement once again showed a considerable expansion, both as regards membership of co-operative societies and the volume of business done.

The growth of the movement was accelerated during the war years by the increased demand for co-operative services, arising from war conditions. The expansion of co-operative buying of domestic and farming requisites by farmers and other consumers would undoubtedly have been considerably greater if the supply position during this year had not been so difficult.

The expansion of co-operative agricultural associations was also influenced by marketing control schemes, which, on the whole, increased the farmers' support of co-operative societies, mainly because the risk and uncertainty attending the marketing of products were largely eliminated by price fixation.

The development of producers' associations is general and also embraces all the products handled, but in the case of maize, in particular, the increase in the quantity handled is particularly marked.

During the 1944 Parliamentary session legislation was introduced altering the basis of taxation in respect of consumers' associations. As a result, these associations are now taxed in full on all their profits, where they carry on business without any restrictions with persons who are not members of the association, but where they restrict or eliminate transactions with non-members, they qualify for certificates as closed associations and are entitled to deduct from

their taxable income the bonuses payable by them to members on the basis of the business carried out.

Number and Membership of Societies.—On 30 June, 1945, there were 309 registered co-operative organizations, with a total membership of 209,550, i.e., an increase of 35 in the number of organizations and roughly 12,000 in the membership. On 30 June 1939, the total figures were 239 societies and 120,483 members. Of the societies which existed on 20 June 1945, 221 were co-operative agricultural societies, with a membership of 150,841.

The increase in the number of societies during the past year is due mainly to the registration of new co-operative traders' associations, and, with few exceptions, these new traders' associations are mostly rural enterprises serving both farmers and town-dwellers.

The grand total of the membership of traders' associations shows no increase, since a large co-operative bank, "Volkskas (Koöperatief) Beperk", was transferred to the register of public companies. The increase in the total membership of co-operative societies is, therefore, almost wholly attributable to the increase in membership of co-operative agricultural organizations.

Business Statistics.—The net funds of co-operative associations which are represented by net share capital, reserves and accumulated profits, increased from £4,263,618 as at 30 June, 1939, to £8,576,060 on 30 June, 1943, and to £10,235,095 on 30 June 1944. Of the total for 1944, £9,058,539 belongs to co-operative agricultural organizations.

The total monetary value of the sales of all the societies increased from £20,644,725 for the year 1938-39 to £39,573,685 for 1942-43 and to £50,716,237 for 1943-44.

The turnover of co-operative agricultural societies amounted to £47,879,256 during 1943-44; maize co-operative societies (including the central company) were responsible for £13,834,326 of this amount. This represents an increase, in respect of the latter co-operations, of £6,634,030 over the previous year. The recorded business carried out by co-operative agricultural societies runs into £42,605,384 in respect of products disposed of, £4,966,438 for farming requisites supplied, and £307,434 for services rendered.

VI. Soil and Veld Conservation and Improvement.

Technical Advice.

NOTWITHSTANDING a gradual increase in personnel, applications from landowners for technical advice increased to such an extent that all applicants could not be attended to with the necessary speed, and farmers sometimes had to await their turn. There are clear signs, therefore, that landowners are growing increasingly anxious about the retrogression of their veld, the diminishing productivity of their arable land and the perceptible increase in soil erosion. There is no doubt about the fact that the Department will be obliged to expand its technical services considerably. This is one of the chief problems which will claim the Department's attention in post-war agricultural reconstruction, and schemes are now being devised for its accomplishment. A considerable organization will have to be built up for the purpose.

Up to the present, the increasing number of applications for technical services have reference mainly to the general *soil-erosion*

control scheme, under which the Department offers financial assistance to landowners erecting soil-erosion control works according to Departmental directions. Applications for the erection of contour banks in cultivated lands are, however, also rapidly increasing. In particular, farmers desire the services of officers to indicate contours in their cultivated lands.

While contour cultivation of lands has already become a comparatively fixed practice in the summer-rainfall area and is being carried out fairly generally in some districts, it has not gained much recognition from wheat farmers in the winter-rainfall area. The heavy rains during the past winter caused very severe erosion of wheat lands. Thousands of channels were formed in the lands. This disaster has forced farmers at long last to appreciate the necessity for instituting control measures. The few isolated farmers who did have well-constructed contour embankments, did not sustain such severe losses of soil and this fact impressed upon the others the necessity for contour farming. The result was that applications for the services of technical officers suddenly poured in to such an extent and with such urgency, that a number of officers from other areas had to be sent to the winter-rainfall area, temporarily, to give their assistance.

Conservation Areas.

Work in the *Vlekpoort Conservation Area*, the first to be proclaimed as such in terms of the provisions of the Forest and Veld Conservation Act of 1941, made good headway during the past year. Activities were commenced early in 1942, but the necessary material and power machinery were practically unobtainable during the war. During the past year, however, tractors and other essential implements were secured and, consequently, the work undertaken by the Department could make more rapid progress.

So far departmental activities have been concentrated mainly on farms purchased by the Government. Those farms which had been so severely eroded that their reclamation was beyond the means of private owners, were purchased by the State for reclamation purposes. They also serve as demonstration farms where various soil-erosion control and reclamation measures can be tested out. Useful information is being collected, especially in regard to the evolution of inexpensive methods for damming up sloods. Several types of brick and concrete weirs were constructed and appear to be very promising.

In regard to the restoration of useful vegetation on impoverished veld, denuded patches, eroded fields, and in sloods which are silting up, various plants and measures are being tested out. Up to the present, the majority of the grasses and other crops introduced from elsewhere, have, for the greater part, proved a failure. Local grasses and karroo bushes appear to give the best results. Where the top soil has not yet been completely eroded, there is still enough grass and bush seed to take root, if stock are kept away during the summer. In places where alluvial soil is caught up—that is, chiefly in sloods where obstructions have been erected—the local common reed appears to be the most suitable plant for fixing the silt and for effecting further silting of the slood higher up, i.e. as the reeds spread upstream, the slood gradually fills up.

In the Vlekpoort River itself the fourth major retaining dam in the pass has been completed, and a commencement made with the fifth. A series of these dams are being constructed in order to check the terrific draining effect of the gigantic channel known as the Vlekpoort River, by impounding silt and so raising the level of

the river bed. The rapid drainage along the Vlekpoort River and its many tributaries has a desiccating effect on the entire length of the valley. It is hoped that this desiccating effect will be diminished as the river and tributary sloods become shallower. Simultaneously, the water table will be raised. At the request of the Department, the retaining dams are kindly being erected by the Department of Irrigation.

Apart from the work carried out by the State, landowners are expected to construct the minor reclamation works themselves and to divide their farms into camps, practise prescribed grazing methods and apply various other measures, in order to protect their farms against further erosion and in this way permanently increase the productivity of their estates as a whole. The Department offers very liberal financial assistance for all these undertakings, and yet farmers in this area are, generally speaking, still reluctant to reclaim their farms for their own sake as well as for that of posterity, and to place their farming systems on a more stable basis. It may become necessary shortly to apply the provisions of the Act more stringently in order to compel landowners to contribute their share towards accomplishing the reclamation of the Vlekpoort valley. While it is true that, up to the present, fencing material was practically unobtainable, a good many other activities could have been carried out in the meantime, as was the case on a minority of farms. The Department prefers not to have recourse to compulsory methods, but naturally it cannot suffer any unnecessary delay in the execution of the scheme.

The area between the Tugela and Mooi rivers in Natal was proclaimed a Conservation Area in April 1944. The facilities made available by the Department in the *Drakensberg Conservation Area* were outlined in the previous Annual Report. Work was commenced during this year. Considerable time was taken up in establishing the necessary organisation and procuring equipment.

The fact that supplies are still so difficult to obtain is a hampering factor. A limited quantity of power machinery and other implements was, however, secured, and the programme of Departmental activities could be commenced. These activities consist in the construction of major soil-erosion control and water-conservation works which are of more general importance and are beyond the means of the owner on whose ground they are erected.

The general soil and veld reclamation and conservation works on private farms are, however, the most important. In co-operation with landowners, a farming system is being evolved for their farms. In the first place, the officers make a careful survey of the property. Particulars in regard to fences, watering places, cultivated lands, veld types, roads, erosion and all important features are indicated on a map of the farm. This is followed by an indication of the changes advocated and the works to be constructed. These embrace direct erosion-control works, the making and construction of camps, stock watering places, silos, the laying out of cultivated lands, the establishment of grass pastures, the diversion of roads; briefly, all the necessary improvements for placing the farming enterprise on a stable basis. This is, however, not all. Grazing and crop-production systems and other measures are prescribed so that a "conserving" farming system can be developed for the specific farm. In order to enable farmers to carry out all these works, liberal financial assistance is given by the State.

All this goes to prove that the narrow idea that erosion control consists merely of the closing up of sloods and building of dams has

now been superseded by a new attitude based on the realization that soil erosion is a symptom of incorrect farming practices, and that it can be effectively combated and permanently prevented only by the application of a suitable farming system on every farm.

Farming systems have already been evolved for a number of farms in the Conservation Area and the owners are putting them into practice. A large number of other farmers are awaiting their turn to be served.

The aim of the whole scheme is, therefore, to reclaim the severely eroded lands, mainly at the expense of the State; to restore the impoverished veld to its original productive condition; to cultivate the lands according to a rotational cropping system of contour farming in order to minimise the loss of topsoil through water and wind erosion, and in this way to build up and maintain the fertility of the lands and to make provision for adequate feeds in order that it may ultimately be possible to apply an effective and profitable farming system on every farm in the Conservation Area.

Future Conservation Areas.—From various quarters groups of farmers have requested that their areas or districts be proclaimed conservation areas. Investigations were made into the conditions in some of these proposed conservation areas and in every case it was established that the Department would be well-advised to take action and direct efforts at accomplishing their reclamation. Several additional conservation areas will be proclaimed during the coming year, but the Department must hasten slowly, for the execution of the work in such a conservation area requires considerable personnel, funds and organisation. It will, therefore, not be possible to accede to all the requests immediately. Moreover, there are also other areas where erosion conditions are so severe, that the Department must give them preference, even if the local landowners do not request proclamation of the areas in accordance with the provisions of the Act.

Pasture Research.

The natural veld remains the most important source of stock feed in the country. Consequently, the various pasture-research centres continued their research work, which is aimed at devising the most effective veld-utilization methods.

The research in this field during the past few years also brought out in full relief other important factors. It was established that the correct usage of the veld will be effective only if a suitable farming system is evolved for the farm as a whole. This applies more particularly to areas where mixed farming systems are the chief aim. Pasture utilization cannot be managed as a separate unit, isolated from crop production or other branches of farming. The various branches must supplement one another and fit into a single pattern, and the farming enterprise must be managed as a homogeneous whole.

Consequently, the work at the pasture research stations developed along these lines. Whereas formerly most attention was given to the veld and established pastures, ever-increasing attention is now being given not only to the application of the results obtained from research, but to the position which the veld, established pastures and other fodder crops should occupy in the farming system, and to the restoration and maintenance of the fertility of arable land.

An example of this development is furnished by the two so-called "unit experiments" which are being laid out at the Athole Pasture-Research Station. One of these experiments, which is already almost in full swing, comprises 100 morgen in one corner of the experi-

ment farm, on which 30 Afrikaner cows with their calves up to the age of 1 year and one bull, must be kept solely on the products of the small farm which constitutes a unit in itself. The stock must be maintained on the veld, on veld hay, hay from the grasses *Acroceras macrum* and *paspalum*, and on cowpeas and possibly also other crops.

Previous experimental work showed that the abovementioned two grasses make excellent growth there and yield a high-quality hay, provided the latter is prepared and utilized according to certain prescriptions. Small-scale experiments in the past have also indicated the principles of veld control and have proved that palatable hay with a high nutritive value can be made from the sour grass which usually makes such luxuriant growth in spring and in the early summer, but which in its later stages becomes unpalatable and very nearly useless for grazing. Methods of enhancing the production capacity of the soil with the aid of compost and fertilizer have also been put to the test.

These and other experimental results are now being applied on the 100-morgen farm, with a view to determining on a practical scale the acreage of veld which must be utilized for grazing and hay, the necessary acreage of established pastures, and how best to utilize these for hay and grazing, the amount and types of other feeds which must be cultivated, the making of compost, etc. The difficulties experienced by farmers in the application of the findings, are now being investigated and means are being devised for surmounting them. The principal aim is to establish a scientifically sound system of veld and soil conservation calculated to maintain livestock in good condition, especially during the difficult winter months—a system which will not be conducive to soil and veld deterioration, but, on the contrary, will lead to the abandonment of overstocking and the adoption of improved farming practices.

The second unit experiment concerns a dairy farm with a herd of Jersey cows, also on a 100-morgen portion of the experiment farm. The idea behind this experiment is the same as in the first, but in this case, milk will be the product.

Veld Control.—The information which has so far been gathered in regard to the utilization and control of the various types of veld could already have been applied to greater advantage if larger numbers of farmers had availed themselves of it. There is still the difficulty of transferring the results of research work to the farmer whose duty it is to carry them out in practice. The unit experiments which are at present under way at experiment stations, are an endeavour to investigate, and subsequently demonstrate, the application of the research results. In the vast areas of the country where sheep or cattle farming is practised on the veld, the principles of veld control can be comparatively easily applied, or at any rate, significant improvement of the existing malpractices can be effected. There is, of course, the concrete difficulty presented by the fact that on practically all farms the erection of fences, etc., is an essential prerequisite to the application of refined systems of rotational grazing. These improvements require capital outlay, and furthermore, fencing material has been and still is in very short supply. As soon as more fencing material becomes available farmers will, however, have to give their serious attention to this matter.

With a view to demonstrating suitable rotational-grazing systems, a number of *co-operative grazing experiments* are being carried out

on farms. During the year a commencement was made on a few additional undertakings. The object is to show:—

(a) That impoverished veld can be restored and rendered more productive; e.g. that veld which had deteriorated as a result of the encroachment of steekgras or other inferior grasses can be restored to good red-grass pasturage, even while the veld is still being used;

(b) that improved or good veld can be maintained in good condition and will yield more and superior grazing, instead of deteriorating and becoming increasingly unproductive;

(c) that noxious weeds such as vermeerbos, and also sheet erosion, can be brought under control if the herbage is kept in a good dense condition.

This work is carried out by farmers on their farms under practical conditions. It is intended to extend the scope of these activities enormously in future, since it is expected that these demonstrations will prove to be one of the most effective means of impressing upon farmers the importance of veld control and the need for its application.

Veld Hay.—In view of the periods of drought and scarcity of shorter or longer duration, which are experienced practically every year in some part of the country, and the vagaries of our climate, provision for times of scarcity must play an exceptionally important rôle in our farming practices.

One means of stock provision and storage which is not enjoying sufficient attention as yet, is the utilization in times of plenty of surplus veld grass for hay-making. Many farmers are still prejudiced against veld hay. Actually, this prejudice is unfounded, based as it is, on an erroneous conception of the principles of veld control and the actual value of good veld hay.

Apart from the losses of stock which periodically succumb in large numbers to hunger, considerable losses are sustained annually in decreased milk and wool yields and in live weight when the slaughter stock become emaciated during winter and early summer owing to inadequate feeding. This happens despite the presence of surplus grass which remains over from the previous growing season and which, if conserved in the form of hay, would have appreciably reduced the losses by maintaining in good condition thousands of farm animals which at present can be tided over the winter only with great difficulty.

The work carried out at the pasture research stations has shown that good veld hay can be made in any part of the country where there is mowable grassveld.

Hay-making in the sourveld areas is of the utmost importance. Sour grass, which grows luxuriantly in spring and early summer, loses its palatability and to a large extent also its nutritive value as the grass grows out, and once it is quite mature, it has very little grazing value. In the young stage, however, it is palatable and nutritious. At that stage, there is also usually more grass than the stock need. The best way of utilizing this surplus nutritious young grass is to mow it in good time and convert it into hay.

The same applies to a lesser extent to mixed veld. While this type of veld can be used as winter grazing, it can hardly be considered good grazing and the production capacity of stock running on it decreases, despite the fact that the veld has a good appearance. This grass, when converted into hay in good time, is far more nutritious than when it is allowed to mature on the veld.

Sweet grasses provide the best winter pasturage. In the sweetveld areas the loss in palatability and nutritive value is therefore very much smaller than in the case of other types of veld. Thus, sweet veld conserved for the winter yields good grazing and in this case hay-making is not so essential. It should be borne in mind, however, that the rainfall in the sweetveld areas is usually more irregular, with the result that periods of abundance are frequently succeeded by periods of scarcity.

If, therefore, during favourable periods the superfluous grass is converted into hay, valuable reserves can be built up for the times of scarcity which are bound to follow. At the Towoomba Pasture Research Station cattle eagerly ate stacks of sweet grass veld hay which was three years old. Apart from the fact that this reserve tided the stock over the difficult period without loss of weight, it also saved the veld, which had already been grazed short, from trampling and destruction.

The earlier the stage at which the grass is mown, the higher the nutritive value and the better the quality of the hay, but on the other hand, the smaller the yields and the higher the costs per ton. It is therefore advisable to strike the happy medium and to mow at a stage of growth when the yield of hay will be considerable, but when the nutritive value will not actually have decreased much.

The pasture research station has found that the early flowering stage is, generally speaking, the best time for mowing. Grass which is already approaching maturity, yields inferior hay, although it could be utilized in an emergency. In the case of sweet veld, however, it will still be quite useful.

At any rate it is better to mow even mature sour grass than to burn it. The grass can be most advantageously used as bedding for animals and as compost material. Moreover, mowing is preferable to burning, inasmuch as mown veld yields more and better pasturage the following season.

It is important that veld hay be made in the correct way. The mown grass must not be left to dry out completely, since the hay will then be of inferior quality and will lack the characteristic smell, colour and palatability of good hay. The grass must be cut on a sunny day and after 2 to 4 hours, should be raked together in windrows. A certain amount of moisture must be retained, since this is essential to the proper maturing of the hay. After the grass has been raked together in windrows, it can immediately be carted and stacked. It should not be left to lie in the windrows for days and should not be worked into wide stacks, since this would lead to self-heating. The stack should be about 12 ft. wide, and should be provided with some type of roof to prevent damage by rain.

Weed Control.

In all four provinces during the past year general progress was made with the control of weeds. There are, however, parts where the expected progress was not made. Having regard to the vast areas which the weed inspectors must serve, it is very difficult to carry out the intensive inspection work which is frequently required, with the result that remote parts of farms can seldom receive the proper attention of the inspector.

The policy in respect of proclaimed weeds has so far always been to sound warnings in cases of negligence, and the Department is reluctant to resort to compulsory measures. The progressive farmer seldom gives any trouble and his full co-operation is usually obtained. It has become evident, however, that there are, unfortunately,

farmers who do not wish to co-operate, and consequently it was decided to take much stricter action during the coming season.

Throughout the country efforts were once again concentrated on rivers, which are regarded as being the most important sources of weed infestation. State assistance with gangs of labourers employed by the Department is still given in cases where weed infestation is such that riparian owners are unable to tackle the control work and are not responsible for the infestations themselves. During the past year State assistance was given along parts of the Vaal River, along the Olifants River, the Great and Little Letaba and the Brandboontjies and Magalakwin Rivers and certain of their tributaries in the Northern Transvaal. In the Cape Province the work was concentrated mainly on the Gamtoos River, in the Humansdorp district. The work carried out by the Department's gangs this year and during the past few years, effected a big improvement.

Eradication of Prickly Pear.—When, a few years ago, it appeared that the prickly-pear pest could not be controlled by the biological method alone, recourse was had to experimental work which actually amounted to a combination of the biological and mechanical methods. In August, 1943, a commencement was made with an experimental scheme involving the cutting down of prickly pear infested with the cochineal insect—*Dactylopius opuntiae*—to assist in the destruction of this plant. Initially, Italian prisoners of war were employed for the work, but subsequently they were replaced by native labourers. Under this experiment, work was carried out in the Cookhouse area and in the Graaff-Reinet district. The scheme was terminated in May, 1945, after a total of approximately 35,000 morgen of prickly pear had been treated in this manner. Under the experiment scheme the Department undertook all cutting operations with its own gangs and the farmer had to shoulder only 25 per cent. of the costs up to a maximum of 5s. per morgen.

Based on the results of the experiment scheme, a commencement was made in April, 1945, with a new prickly-pear eradication scheme consisting of two divisions, *viz.*, a Departmental scheme and a subsidy scheme.

(a) *Departmental scheme.*—Under this scheme the cutting down of prickly pear is undertaken by labour gangs employed by the Department, subject to the following provisions:—

(i) That applicants conclude an agreement with the Department under which they give security, in a form acceptable to the Department, for a sum equivalent to 50 per cent. of the preliminary estimate of the cutting costs previously fixed by the Department; or, alternatively, register a bond in favour of the Department against their title deeds, for the sum of the preliminary estimated cutting costs, plus costs incidental to the registration of the bond;

(ii) that further security may be required if it appears that the preliminary estimate is insufficient for the completion of the work;

(iii) that the work will be suspended unless security for a sum equivalent to 50 per cent. of the further estimate for the completion of the work is furnished in advance;

(iv) that repayment of the sum owed to the Department be made on completion of the cutting operations, or over a period of 13 years as from the conclusion of the operations.

On completion of the cutting operations, certificates of clearance will be issued in respect of all land treated under the scheme. Once

the certificates have been issued, landowners will be held responsible for further control.

(b) *Subsidy Scheme*.—Under this scheme landowners and local authorities can obtain assistance for the cutting down of prickly pear on their lands. The following provisions, etc. were prescribed:—

(i) Applications for participation must be submitted and cutting operations must not be commenced before formal approval has been obtained.

(ii) Preliminary estimates of cutting costs are made by the Department before the cutting operations are sanctioned.

(iii) Permission is granted to every applicant in writing. On completion of the cutting operations the land is inspected, the work approved and a final estimate made of the costs.

(iv) Landowners who have carried out the cutting operations to the satisfaction of the Department, will then receive a cash bonus of 50 per cent. of the Department's final estimate of the costs involved.

On completion of the work, certificates of clearance are issued, as in the case of the Departmental Scheme.

The prickly-pear eradication scheme is progressing satisfactorily and up to the end of August, 20,400 morgen of prickly pear had been treated under the Departmental Scheme. Under the Subsidy Scheme applications were dealt with affecting approximately 25,000 morgen of prickly pear.

It is estimated that if the present rate of progress is kept up, the major portion of the prickly pear infestations will have been dealt with by the time the prescribed period of two years has expired.

Since the institution of the prickly-pear scheme, the number of labourers has been greatly increased and about 1,100 native labourers and 35 European foremen are now employed. The latter consist, for the greater part, of returned soldiers.

Jointed cactus.—During the past year very little could be done to eradicate this weed. It is intended, however, to make a commencement during the following financial year with an eradication scheme. As the prickly pear problem requires less attention, it will be possible to divert labour to the eradication of jointed cactus.

VII. Control of Agricultural Pests and Stock Diseases.

STOCK diseases, insect pests and fungous diseases continue to hamper agricultural production in an extreme degree. Their control is one of the biggest problems with which the Department has to contend. Consequently, the Department devotes much energy to the investigation of these problems and the discovery of remedies. Great success has been achieved in this connection in the course of a number of years, but for obvious reasons—chiefly owing to the wide field which must, as a rule, be covered, and the rapidity with which the pests and diseases spread—the desired degree of success cannot always be attained. It should be remembered, however, that several other Divisions, directly or indirectly, devote a great deal of their time to these problems.

Below is a short description of the problems which came prominently to the fore during the past year.

Insect Pests and Fungous Diseases.

Once again control and research work was carried out in connection with a large number of insect pests.

In December, 1944, the first generation of *maize-stalk borer* attacked early mealies over a large portion of the maize belt. For the moths of this generation a considerable portion of the maize crop was at a most favourable stage, with the result that farmers suffered appreciable losses. Research in connection with this pest is being continued.

Army worms first made their appearance in January, but as usual, the major damage was caused in March-April. In the northern Transvaal the damage was caused mainly to grazing, while on the highveld it was the teff lands which suffered most. Owing to the poor rainfall in large parts of the country, harvester termites caused appreciable damage to pastures over an extensive area as early as the summer of 1944-45, and since the drought persisted during the subsequent winter and spring, the damage assumed increasingly serious proportions.

In the Plant Regulatory Service Section of the Division of Entomology, routine inspection and the quarantine service were carried out without a hitch. No particular pests were intercepted, and in view of the improved quality of the timber products, difficulties in regard to the importation of timber were less marked than during the few preceding years.

In the case of *forest pests*, severe outbreaks of the brown-tail pine moth were observed, but this pest suddenly disappeared without any human intervention. On the other hand, timber pests, particularly the European wood borer and powder-post beetle, caused widespread and intensive damage, mostly in the coastal towns of Port Elizabeth and Cape Town. All possible advice is furnished to owners. The promulgation of regulations to facilitate general control, was held back owing to the absence of suitable chemicals. Now that the war is over, the amelioration of this position ought to be easier.

The control of *fruit pests* was also seriously hampered by the scarcity of insecticides, especially nicotine, in respect of which there has already for some years been a world shortage. Large-scale losses were obviated, however, by conducting the sale of available stocks, through definite channels.

The Western Province Fruit Research Station continues to devote intensive attention to the control of the *codling moth*. On the whole, weather conditions were more favourable to the codling moth than during the previous year. On the other hand, the spray position was better and the pest could, generally speaking, be more effectively controlled. During the past 3 years in particular, exceptional progress was made with the control of codling moth, owing to improvements in spraying methods. Nevertheless, the pest occurred on a severe scale at a few places in the western Cape Province. The long-term spraying experiment on apple trees, which is in progress at Elgin in connection with damage caused by sprays and codling moth control, was continued. In so far as the control of the codling moth is concerned, there was no reliable difference between the efficacy of spraying with lead arsenate, fixed nicotine, and summer oil emulsion. The results obtained from fixed nicotine, and all these sprays were most satisfactory, owing to the suitability of the spraying programme. This spraying experiment showed once again that in the highveld area three sprayings at intervals of about ten days must be applied during January in order to control the second generation of the codling moth.

An extensive spraying experiment was carried out on apricots in the Wellington area, as a sequel to the preliminary experiments conducted the previous year. The results clearly revealed that the infestation can be kept below 5 per cent. by means of 2 to 3 sprayings of fixed nicotine, provided that these sprays are applied at the correct time. The results of two years have now shown that the first spraying should be applied round about the 15th of October in the case of Royal apricots, and that subsequent sprayings should be applied at intervals of 10 days. Once again it has been established that fixed nicotine does not injure the apricots trees.

Apart from the two parasite species imported in 1942, three other species of codling moth parasites are being bred in the laboratory of the Western Province Fruit Research Station for liberation and distribution in the fruit areas and for experimental purposes. In the case of one of the parasites which attack codling moth pupae, a great measure of success was achieved with the mass breeding and 27,000 parasites were bred during the past winter. In the summer months it will be possible to breed over 2,000 a day. Significant progress was also made with the breeding of the other species, but all the problems in regard to large-scale mass breeding have not yet been satisfactorily solved.

The *vine mealy bug* was particularly severe this year. The areas which suffered most were the Hex River Valley, Rawsonville, Paarl and Stellenbosch. Although ant control was applied in certain parts the mealy bug pest, nevertheless, caused some damage. This pest became troublesome earlier than usual this year. The most probable reason for this is that the early summer up to the end of December was exceptionally moist. This wet and cool weather stimulated the breeding of the mealy bugs, but was most detrimental to their natural enemies. The result was that during January the vines which had been attacked by these pests were heavily infested. From January to April exceptionally dry weather was experienced. These conditions again, had the opposite effect. Consequently, by the end of the grape season a large percentage of the mealy bugs had been destroyed by natural enemies. During July and August, ant control was applied on a large scale in all the infested areas, so far with good results.

In so far as *bacterial blight* is concerned, the position became more critical. The disease has also been observed on two farms in the Hex River Valley. Its appearance in this area is exceedingly unfortunate, since the vineyards extend uninterruptedly through the valley from De Wet, where the outbreaks occurred and consequently the disease will in all probability spread over the whole of the table-grape area. In areas where the diseases had already gained a grip, it spread to such an extent that the most susceptible varieties, Waltham Cross and Barlinka, are systematically being eliminated.

The two long-term experiments are being continued, the object being to determine varietal susceptibility and the survival capacity of the causal bacteria in the soil. Up to the present no results have been obtained from these experiments.

The Stellenbosch-Elsenburg College of Agriculture has performed some important work in connection with fungus and entomological problems in so far as vegetables are concerned. In this case particular reference must be made to the research in regard to white grubs, vegetable beetles and thrips, and also to virus diseases of tomato plants.

As regards *tobacco pests* the most striking feature was the confirmation of the findings, during the previous year, of the

Divisions of Plant Pathology and Entomology that double planting—with subsequent thinning, if necessary—is effective in the control of the krommek disease on the land. Special attention was devoted to potatoes. In the highveld area tuber moths caused considerable damage to the exposed parts of plants, but standard control methods proved effective. In addition, eelworms in potatoes received special attention, and also the problems relating to virus diseases of this product.

Much time was devoted to the drafting of farming systems, especially on settlements, incorporating the systematic control of *eelworm* by cultivation methods. In this connection, it may be stated that there is reason for hoping that the utilization of compost on an appreciable scale in infested soil will have a beneficial effect. Experimental work in connection with the regulation of planting times indicate strongly that if the chief growing period coincides with exceedingly high summer temperatures, striking results can be obtained with potatoes in spite of eelworm infestation on the lands. Further studies of actual soil temperatures in respect of the direct influence on the spread of the pest during the growing period appear to be promising.

Valuable work was carried out by the Division of Botany and Plant Pathology in connection with the inspection of citrus orchards and nurseries for *scaly bark* (psorosis). Special attention was devoted to *mosaic disease* in sugar cane. It must be mentioned here that, unfortunately the disease was found among the most popular sugar cane species. Inspection work in this connection is being vigorously pursued.

Apart from the breeding of *Karoo-caterpillar parasites* for liberation in the veld, much attention was also given in the parasite laboratory of the Division of Entomology to fundamental research in regard to the interaction of insect populations and the habits of certain insects. In the case of *blowflies*, research was concentrated on the probable effect of the colouring of the insect species and their parasites in the veld. Valuable data were collected; *inter alia*, that in all probability there is little actual competition between the various blowfly species and that they apparently cannot influence one another's numbers to any great extent in the veld. It further appears that maggots of *Lucilia*, both the *cuprina* and *sericata* form, can adapt themselves amazingly well to unfavourable conditions and that it is mainly due to this factor that this species is able to occur on such an extensive scale.

As regards the control of prickly pear by means of insects, the position is static. Considerable progress is being made with the cutting down of infested prickly pear. The prolonged drought of the past eighteen months was decidedly favourable to the *cochineal* which consequently did not deteriorate any further and revealed a stronger annual increase than during the preceding few years. As regards the usefulness of the *lagochyris* it is now certain that it has practically no value as a means of control.

The testing out of *insecticides* was continued. Of the three main toxins which were under control, only nicotine is still scarce. This shortage is keenly felt. As regards the newer toxins, small quantities of D.D.T. are now appearing on the market. This preparation is regarded as a very valuable discovery, but the public is warned against undue optimism, particularly having regard to the fact that not all insects are susceptible to this toxin in any marked degree. Gammexane will perhaps supplement some of the deficiencies, but it is not yet available for experimental work

Sodium fluosilicate has good possibilities for use against the stalk borer and the army worm. If the efforts at supplying this toxin in a suitable physical condition in the form of a powder succeed, it will be very valuable for use against these two pests and for numerous other purposes.

Locust Destruction.

During the past 12 months it was necessary to launch only one campaign, viz. against hoppers of the brown locust. The required control measures were once again carried out under extremely difficult circumstances, but the results were satisfactory. Crops and grazing in all parts of the country were completely safeguarded, and, moreover, it was found possible completely to suppress the outbreaks which had started during the previous season.

Although a few flying swarms of red locusts invaded the Union during the first half of the summer, no hopper outbreaks resulted in the Union and there was therefore no necessity for a campaign against hoppers.

The Brown Locust.—In the eastern districts incipient hopper outbreaks occurred on a smaller scale than was expected from the large numbers of flying swarms which had been observed before the winter of 1944. In this area the incipient outbreaks were confined to two districts, namely, Richmond and Murraysburg. In some cases control measures were not necessary in these two districts, since the swarms became scattered in the early hopper stage. It appears, therefore, as if the locusts in this area reached a climax during the previous season, in many cases without forming swarms, and that further retrogression took place during the past season. This was not entirely unexpected, since in the previous report mention had already been made of such a possibility.

In the western districts incipient outbreaks also occurred on a slightly smaller scale than was expected. In this area the improvement was due to insufficient rain, unfavourable climatic conditions and an increase in natural enemies. In comparatively small strips where the rainfall was adequate for hatching, however, hopper outbreaks occurred in the Victoria West, Carnarvon, Calvinia, Prieska, Kenhardt, Namaqualand districts and Warmbaths and Bethanie in South-West Africa. It appears that the numbers which reached a climax without any large-scale formation of swarms, were probably also present in South-West Africa during the past season, but the indications are that they will decrease still further there.

In the eastern districts *gregaria* hopper outbreaks occurred on known nests in the Murraysburg, Richmond, Hanover, Colesberg, Middelburg and Graaff-Reinet districts, and it was found possible to destroy all the hoppers in their early stages in the neighbourhood of the nests. In consequence of this success the eastern incipient areas are quiet now and there is no immediate danger.

In the western districts, *gregaria* outbreaks also occurred in the known hatching areas in strips where adequate rains were experienced. Some nests, however, did not receive sufficient rain during the past summer to enable the eggs to hatch, and a close watch is still being kept on them. This also applies to a small number of nests in Kenhardt, Namaqualand, Calvinia and in Warmbaths and Keetmanshoop in South-West Africa. The fate of these nests is uncertain, since conditions have been dry for over eighteen months.

In most districts *gregaria* and incipient outbreaks occurred simultaneously, with the result that mixed populations developed.

This complicated matters somewhat, especially in the sparsely populated and inaccessible parts, such as the north-western Cape Province, Namaqualand and South-West Africa.

Owing to this development it was often difficult to determine the phase to which certain populations belonged. In some cases (Murraysburg and Kenhardt) concentrated swarms, probably *gregaria*, became dispersed in the early stages, while elsewhere more or less scattered hoppers (Namaqualand, Prieska and Kenhardt) again became concentrated at a later stage of development. It must be mentioned here that egg parasites (*Systoechus*) were active in the latter districts, with the result that even large and dense egg nests hatched out comparatively sparsely. This probably explains the formation of small swarms at an advanced stage of development by locusts which resembled scattered hoppers.

Notwithstanding these complications the control measures succeeded. As far as known, only two flying swarms formed in December, 1944 viz., in Namaqualand and in the southern portion of Warmbaths in South-West Africa. It was not possible to remain on the track of these swarms for longer than approximately two weeks. After this they dispersed and eggs were probably laid in scattered formation in the more or less inaccessible parts of Namaqualand.

According to an extensive investigation instituted towards the end of the summer, it appeared that the adult populations were, on the whole, low, except in two small areas in Prieska and in Warmbaths in South-West Africa, where flying swarms of considerable density were observed during April. Small incipient outbreaks can be expected here next season. The prospects for next season are therefore as follows:—

(1) No incipient outbreaks appear to be possible during the first half of the season, except perhaps in the two areas where considerable numbers of flying swarms were observed during April, 1945. It is impossible to make any definite predictions with regard to the second half of the season, but serious developments are not expected.

(2) No dense egg nests were formed during the season. As has, however, been mentioned, large numbers of eggs which were laid 18 months ago, have not yet hatched out. It is improbable that dense swarms will still be formed out of these nests, but a close watch must nevertheless be kept on them for possible developments, in the event of conditions again becoming favourable during the following season.

The Red Locust.—During the season, reports were received of three flying swarms, the first from Groblersdal (Transvaal) in October, and the second and the third from Waterberg (Transvaal) and Vryburg (Cape Province) during December. These swarms were probably harassed by locust birds with the result that no eggs were laid and a campaign against hoppers was not necessary.

According to the available reports, there appear to be no swarms in the neighbouring territories and there does not seem to be much danger of an invasion of the Union during the coming season.

Expenditure.—The expenditure incurred by magistrates in connection with transport, labour and temporary locust officers in the campaign against hoppers of the brown locust amounted to £5,100.

Stock Diseases.

Our farmers not only had to contend with the familiar stock diseases during the year, but in certain parts of the country two unfamiliar diseases also occurred.

Lumpy-Skin Disease.—A cattle disease, unknown in the Union, made its appearance in the north-western Transvaal this year. This disease is characterised by the appearance of lumps over the entire skin and by swelling of the legs, thorax, dew-lap and head, and also by ulcers in the mouth and nostrils. The majority of the animals recover from the disease, but a small percentage succumb and others develop complications, including, *inter alia*, ulcers. Female animals usually lose their fertility. The sick animal loses condition, in cows lactation usually stops completely, and in all affected animals a general set-back is noticed.

This disease has been known in northern Rhodesia for some time past, where it is called lumpy-skin disease or *pseudo urticaria*. In Bechuanaland it is known as "Ngameland" disease.

The disease is still somewhat obscure to veterinary science, but an intensive study is in progress at Onderstepoort, and it is trusted that more information will be made available in course of time.

Although the mortality from the disease is not heavy, serious financial losses are sustained and consequently it is necessary for the State to take steps to control the infection. The disease was therefore proclaimed a disease under the Stock Disease Act, and the Division of Veterinary Services is engaged in applying the necessary control measures in an effort to prevent its spread.

Newcastle Disease.—This destructive disease of poultry, formerly also unknown in the Union, made its appearance during the year in the coastal belt of Natal. In view of its danger to the poultry industry, active steps were taken to suppress it. The measures succeeded, not only in regard to the prevention of the spread of the disease inland, but also in confining the infection to a small area in Durban. It is hoped that it will shortly be possible to wipe it out completely.

Foot and Mouth Disease.—During November, 1944, outbreaks of this disease were discovered along the boundaries of the Kruger National Park in the Barberton and Pilgrim's Rest districts. Later the infection spread over wide areas of the latter district and even as far as the Letaba district.

There was strong circumstantial evidence supporting the belief that the game in the Game Reserve were responsible for the disease from which the Union had been free since 1939. With the kind co-operation of the Game Reserve Board, investigations were made with a view to establishing the possible incidence of the disease in the Game Reserve. Although lesions were found in various kinds of game, which are indistinguishable from those associated with Foot and Mouth disease, the Department did not succeed in recovering the causal virus in animals, except in domestic animals. Moreover, cattle sent into the Reserve and directly exposed to contact with the game, did not contract the disease.

In view of the serious proportions of the outbreak and the complicating factor in so far as game are concerned, the slaughtering policy could not be applied as in the case of previous outbreaks. Consequently, strict quarantine and isolation measures were applied, until eventually the disease was brought under control.

Although no active infection has been observed for the past six months, strict quarantine measures are still being applied and the affected districts are being effectively isolated. Investigations are also being made into the best methods of preventing contact between susceptible domestic animals and game.

Nagana.—The control of the tsetse fly is being continued through extermination of game, bush eradication and the destruction of the

fly itself with the Harris trap. A total of 20,705 head of large and small game were shot in the Umfolozi and Mkuzi reserves, on the Ntambanana, Hluhluwe and Mkuzi farms, and in the adjoining native reserves. These activities are carried out under the supervision of five veld wardens, the local farmers' association and the Department of Native Affairs. Considerable progress has been made with the eradication of bush. It has been found that a strip of uprooted bush, half a mile in width, is inadequate for completely preventing the fly from spreading. That the density of the fly population has increased in the past year in all three game reserves is evidenced by the available figures in respect of flies caught by the Harris trap.

Exceedingly satisfactory results were obtained with the experimental use of D.D.T. and it is hoped to apply this method of control more intensively. A large-scale experiment in spraying a portion of the Mkuzi reserve, in Zululand, with D.D.T. from aeroplanes, for the control of the tsetse fly, has been organised and will be carried out shortly.

East Coast Fever.—There was a further improvement in the East Coast fever position in the Union. Outbreaks of the disease decreased from 24 last year to 12 this year. Of the latter outbreaks 11 occurred in Natal and 1 in the Transvaal. This must be regarded as satisfactory in view of the difficulties experienced in maintaining a sufficiently large personnel for the intensive control measures which are necessary for suppressing this stubborn disease.

• *Anthrax.*—The position in regard to anthrax continues to be satisfactory. Mass inoculation, embracing approximately 2,000,000 head of cattle, is being continued as a routine precautionary measure.

Lamsiekte.—After completion of the factory building for the manufacture of a lamsiekte vaccine, a commencement has been made with the production of the vaccine. Efforts are being directed at reducing the size of the dose and at developing a culture capable of regularly producing a first-rate toxin for the large-scale production of the vaccine.

Contagious Abortion.—The demand for the vaccine increased. The vaccine is now recommended for calves, and it is trusted that its use will greatly reduce the incidence of the disease.

Scab.—This disease, which at one time constituted a serious menace to the sheep industry in general and the wool industry in particular, has been wiped out to such an extent that it now occupies an insignificant place among the Union's stock diseases. Nevertheless, 10 outbreaks were discovered during the year and these were all treated. Nine of these were in the Transvaal and one in the Cape Province.

• *Vaccines.*—After careful consideration the issue of the redwater and galsiekte vaccine was discontinued as from 1 February, 1945, owing to the fact that this portion of the vaccine does not keep well and, moreover, does not afford effective protection against the European form of redwater. Redwater is now being controlled by other means. In April, 1945, the issue of the galsiekte vaccine was also discontinued.

The number of doses of *horse-sickness vaccine* issued, was more than trebled in comparison with the previous year. This increase is due to a keen demand for vaccine from countries in the Middle East where a serious outbreak of horse-sickness occurred. The issue of *nodular-worm remedy* has decreased considerably, but this can be ascribed to the fact that Tetram is once again obtainable and

that farmers are utilizing it as a worm remedy. The drought is probably also the cause of the decrease in the number of doses of *bluetongue vaccine* and *blowfly vaccine* issued.

The blue tick.—This tick spread considerably owing to the fact that it developed a resistance to arsenical dips; consequently there was an increase in the incidence of redwater and galsiekte.

Although it was established that this tick can be controlled by the addition of nicotine to the ordinary arsenical dips, efforts at controlling it along these lines were, for the greater part, frustrated by the difficulty experienced in procuring nicotine sulphate in adequate quantities, owing to war conditions. Attempts to obtain supplies are, however, being vigorously prosecuted, and experiments are also being conducted on other remedies, such as D.D.T. and Gammexane.

Research.—Research is being carried out on all the above-mentioned stock diseases as well as numerous others. The latter group includes inter alia, heartwater, tuberculosis, black quarter and paratyphoid. It is intended to publish in the the course of 1946, a fairly comprehensive report on the veterinary work of the Department, with special reference to research work.

Committee of Investigation.—A committee was appointed during the year to investigate various matters appertaining to the veterinary services of the country. The investigation was directed mainly at ensuring an effective State and private veterinary service and the facilities necessary for the provision of such a service. The report of the committee is expected towards the end of 1945.



Tomatoes.—Large supplies of tomatoes, mainly from local sources, reached the markets. In many cases the quality was inferior. Prices nevertheless remained firm and on some markets even increased towards the end of the month.

Vegetables.—Fair supplies of green beans, cauliflower, pumpkins and Hubbard squashes reached the markets. The supplies of other vegetables, however, were generally very limited.

Fodder.—With mealies almost unobtainable, only mixed fodder was available. Lucerne hay, mostly of inferior quality, was well supplied but the supply was still insufficient to meet the demand.

Eggs.—Egg supplies were generally limited and prices throughout were somewhat higher than those of the previous month.

Index of Price of Field Crops and Products.

THIS index, as shown elsewhere in this issue, increased during the month by 2 points to the new record peak of 174 (with 1936-37—1938-39 as basic period).

The most important increase occurred in the group "Other Field Crops", namely from 341 to 349 for January; and in the group "Poultry and Poultry Products", namely from 202 to 223. On the other hand slight decreases occurred in "Hay", namely from 194 to 191; and in "Slaughter Stock", namely from 183 to 179. The decrease in "Slaughter Stock" occurred as a result of the reduction in the seasonal prices of slaughter cattle, while the additional seasonal rise in the prices of slaughter cattle on the Durban and Pietermaritzburg markets which had been in force from 2 July 1945, was again withdrawn from 2 December 1945. See Crops and Markets of September 1945 (page 584).

Index of Prices of certain Farming Requisites.

THESE indexes as shown elsewhere in this issue, have been revised on the strength of more and better information which has now become available. These revised indexes, however, differ slightly from those which were previously compiled quarterly, except in the case of fertilizer which has now risen somewhat as result of a few amendments made in the index.

The Division intends to expand this index gradually, especially in the case of agricultural implements and spare parts as soon as more information in this connection can be collected.

Agricultural Conditions in the Union during January, 1946.

Rainfall.—During the month soaking rains fell in the northern and north-eastern Orange Free State and the whole of Natal and Transvaal, while scattered showers occurred over the rest of the Union. In the north-western Cape Province, as well as in the Karoo, drought conditions were, however, still experienced.

Condition of livestock.—In those areas where good rains fell, grazing naturally improved and so also the condition of stock, with

the result that stock losses declined. Lumpy skin disease in cattle still occurred and even spread to the eastern and western Orange Free State, whereas in the past it had been confined to the Transvaal. In Natal nagana still caused losses.

Crops.—After the rains, prospects for summer crops improved considerably, particularly in the northern and eastern Orange Free State, the highveld of the Transvaal and the western Transvaal. Young maize, kaffircorn, beans, potatoes and teff in general were promising well, although late, and the possibility existed that early frost might cause damage. In Natal the sugar-cane crop is recovering rapidly after the drought, although it is expected that yields will be below normal. An average chicory yield is expected in the Alexandria district, although this area suffered severely from the drought.

Prices of Dairy Products.

As a result of the drought, the production of butterfat, cheese-milk and factory milk decreased considerably during the current summer season. Because of this decrease in production and the consequent increase in the cost of production per unit, the Dairy Industry Control Board decided to fix the basic price of butterfat, cheese-milk and factory milk at a higher level as from February 1946. A higher price level was also deemed necessary to enable producers to maintain the highest possible level of production for the remainder of the season, especially in view of the fact that it will involve additional expense to produce winter feed for this purpose at the present stage when some of the best months for production have already passed. An increase in producers' prices, and consequently also in consumer's prices, had therefore inevitably to be effected in order to maintain production and obtain supplies for the coming winter season.

As from 1 February 1946 the following basic prices for the above-mentioned dairy products came into operation:—

Butterfat.—The basic price of butterfat has been fixed at 2s. 1d., 1s. 11d. and 1s. 9d. per lb. for 1st, 2nd and 3rd grade butterfat, respectively. This is an increase of 2d. per lb. on the previous basic price as fixed on 1 November 1945.

The winter premium of 4d. per lb. butterfat which came into operation during November 1945 was discontinued on 31 January 1946. The Board intends paying a winter premium of 4d. per lb. butterfat during June 1946, and of 6d. per lb. from July 1946 until October 1946.

Butter.—The wholesale prices of factory butter have been increased from 1 February 1946 by 2d. per lb. to 2s. 2d., 2s. and 1s. 10d. per lb. for 1st, 2nd and 3rd grade, respectively; and retail prices to 2s. 4d., 2s. 2d. and 2s. per lb. respectively.

Cheese milk.—The basic prices of cheese milk have been increased from 10½d. per gallon (or 2s. 4½d. per lb. butterfat contained therein), as fixed on 1 November 1945, to 10¾d. per gallon (or 2s. 5¾d. per lb. butterfat) as from 1 February 1946.

Payment of the special winter premium of 2d. per gallon on cheese milk (or 5½d. per lb. butterfat) which has been in operation since 1 November 1945, was discontinued on 31 January 1946. The Board intends paying a winter premium of 2d. per gallon on cheese milk during January 1946, and of 2½d. per gallon (or 6½d. per lb. butterfat) from July to October 1946.

Cheese.—The price of cheese has also been increased by 1d. per lb. throughout from 1 February 1946. At present the wholesale price of Cheddar cheese is 1s. 7d., 1s. 6d. and 1s. 4d. per lb. for 1st, 2nd and 3rd grade, respectively; and that of Gouda cheese 1s. 7d. per lb. for 1st grade, while for ungraded Gouda cheese a maximum price of 1s. 7d. per lb. and a minimum price of 1s. 3d. per lb. have been fixed. The maximum retail price of Cheddar cheese is at present 1s. 10d., 1s. 9d. and 1s. 7d. per lb. respectively; and 1s. 10d. per lb. for Gouda cheese.

Condensing milk.—The price of condensing milk has been increased from 11½d. per gallon (or 2s. 7½d. per lb. butterfat) to 11¾d. per gallon (or 2s. 8¾d. per lb. butterfat) as from 1 February 1946 to 31 May 1946. From November 1945 up to end January 1946 the price of condensing milk was 13¼d. per gallon (or 3s. 0¾d. per lb. butterfat).

It is the intention of the Board to fix the price at 13¾d. per gallon (or 3s. 2¼d. per lb. butterfat) for June 1946, and at 14¼d. per gallon (or 3s. 3½d. per lb. butterfat) from July to October 1946.

Maximum Prices of Oat Hay.

Oat hay.—The maximum prices of oat hay, as fixed on 28 September 1945 (see *Crops and Markets* of November 1945), have now been amended.

The maximum producer's prices of unbaled oat hay remains unchanged at 4s. 6d. per 100 lb. free-on-rail producer's station, while the maximum price for baled oat hay has been increased by 3d. to 5s. 3d. per 100 lb.

Upon re-sale, the above maximum prices may now be increased by 9d. instead of 6d. per 100 lb., plus railage and transportation costs. From April 1946 to October 1946, 1½d. per 100 lb. per month may, however, also be added to the above prices.

Cut oat hay.—Maximum prices for cut oat hay have also now been fixed. The maximum prices at which cut oat hay (in bags or baled) may be sold, have been fixed at 7s. 6d., 6s. 6d. and 2s. 6d. per 100 lb. free-on-rail manufacturer's station for 1st grade, 2nd grade and under 2nd grade, respectively, while the maximum wholesale prices (in bags or baled) have been fixed at 8s. 6d., 7s. 6d. and 3s. 6d. per 100 lb. for the respective grades, plus railage and 1d. per 100 lb. per mile transportation costs. Also in the case of cut oat hay prices may be increased by 1½d. per 100 lb. per month from April 1946 to October 1946.

Cut oat hay may contain admixtures of lucerne, chaff, teff or other grasses, but must contain not less than 35 per cent. by weight of oat kernels of cultivated oats for 1st grade, and not less than 20 per cent. for 2nd grade.

(See *Government Gazette Extraordinary* of 11 January 1946.)

Maximum Prices of Rooibos Tea.

THE maximum fixed prices of rooibos tea have been withdrawn as from 8 February 1946. See *Government Gazette Extraordinary* of this date.

Maximum Prices of Poultry.

THE maximum prices at which ducks, geese, muscovy ducks and fowls may be sold are given below. These prices apply to auction sales as well as to other sales.

The wholesale price given below is the maximum price at which a dealer may sell poultry to another dealer, while the retail price is the maximum price at which poultry may be sold by any person to any other person except by a dealer to another dealer. A dealer does not include a market master or agent or employee of a market master when he sells poultry on behalf of a farmer or producer.

	Maximum whole- sale price per lb. net weight delivered to purchaser.	Maximum retail price per lb. net weight delivered to purchaser.
	s. d.	s. d.
1. Ducks, geese and muscovy ducks—		
Dead weight, plucked only.....	1 7	1 11
Dead weight, dressed or prepared in any manner other than plucked only.....	1 8	2 0
2. Fowls—		
(a) Live bird.....	1 5½	1 5½
(b) Dead bird neither plucked nor dressed nor prepared in any manner whatever.....	1 4½	1 6½
(c) Plucked bird; feet, head and entrails not removed.....	1 6	1 8½
(d) Plucked bird; head removed. feet and and entrails not removed.....	1 7	1 9½
(e) Dressed bird; head and feet not removed.	1 8½	1 11½
(f) Dressed bird; head removed, feet not removed.....	1 9½	2 0½
(g) Dressed bird; feet and head removed....	1 11½	2 3
(h) Dead bird (whether plucked and/or dressed or not) prepared in any other manner.....	1 3	1 5
3. Kosher-killed poultry stamped to that effect..	The relevant price as above, plus 3d. per bird.	The relevant price as above, plus 3d. per bird.

These maximum prices remain unchanged as previously fixed. See Government Gazette Extraordinary of 11 January 1946.

The maximum prices of turkeys were given in *Crops and Markets* of January 1946.

Maximum Prices of Eggs.

THE maximum wholesale and retail prices of eggs in the controlled areas, as fixed on 14 December 1945 (See *Crops and Markets* of February 1946), were increased by 4d. per dozen for all grades as from 11 January, 1946 and again by 3d. per dozen as from 1

February 1946. The maximum prices per dozen as from this date are therefore as follows:—

	Wholesale.	Retail.
	s. d.	s. d.
Grade I—		
Extra large.....	3 0	3 3
Large.....	2 10	3 1
Medium.....	2 8	2 11
Small.....	2 6	2 9
Grade II—		
Large.....	2 8	2 11
Medium.....	2 6	2 9
Small.....	2 4	2 7
Grade III.....	2 5	2 5

(See Government Gazette Extraordinary of 1 February 1946.)

Review of the 1944/45 Cotton Crop.

(Compiled by the Office of Cotton grading, P.O. Box 956, Durban.)

Owing to lack of rain during normal planting time, and extreme heat the germination was uneven. Much of the cotton that germinated was scorched. Late plantings yielded a poor crop due to drought and an early Winter. As per Ginners' returns the total crop for 1944-45 amounted to 135,087 lb. lint or 293 running bales.

Compared with those of previous seasons, the details are as follows:—

	1944-45.	1943-44.	1942-43.	1941-42.	1940-41.
Running bales.....	293	525	472	710	1,612
Statistical bales (500 lb.)....	270	530	467	683	1,486
Lint (lb.).....	135,087	264,989	233,439	341,413	742,902
Seed cotton (lb.).....	405,790	768,035	699,334	1,067,105	2,125,199
Seed [delinted and undelinted (lb.)].....	230,154	429,142	425,295	672,348	1,307,052
Linters (lb.).....	22,598	40,515	31,948	62,631	78,501

Production in different areas, with the last two seasons' figures for comparison, is as follows:—

	Seed Cotton (lb.)		
	1944-45.	1943-44.	1942-43.
Natal and Zululand.....	36,149	129,144	93,106
Rustenburg area (including Pretoria and Marico).....	12,947	5,633	19,641
Northern Transvaal (including Waterberg, Pietersburg and Zoutspansberg).....	—	20,992	1,868
Eastern Transvaal (including Middelburg, Lydenburg and Barberton).....	354,762	599,825	496,427
Cape Province.....	1,932	12,441	29,727
Swaziland.....	—	—	58,565

CROPS AND MARKETS.

GRADING.

Comparison of Staple.	1944-45.	1943-44.	1942-43.	1941-42.
	Bales. Per cent.	Bales. Per cent.	Bales. Per cent.	Bales. Per cent.
1 $\frac{1}{4}$ inch and above.....	3 1.02	— —	23 4.87	18 2.54
1 $\frac{3}{16}$ inch.....	— —	2 0.38	— —	11 1.55
Full 1 $\frac{1}{2}$ inch.....	— —	— —	13 2.75	— —
Good 1 $\frac{1}{2}$ inch.....	277 94.54	476 90.67	337 71.40	391 55.07
1 $\frac{1}{2}$ inch.....	13 4.44	47 8.95	99 20.98	290 40.84
1 $\frac{1}{16}$ inch and below.....	— —	— —	— —	— —
TOTAL.....	293 100	525 100	472 100	710 100

Comparison of Grades of Good Colour Cotton.	1944-45.	1943-44.	1942-43.	1941-42.
	Bales. Per cent.	Bales. Per cent.	Bales. Per cent.	Bales. Per cent.
Middling fair.....	— —	— —	— —	— —
Strict good middling.....	90 30.72	8 1.52	42 8.90	36 5.07
Good middling.....	91 31.06	191 36.39	80 16.95	195 27.46
Strict middling.....	89 30.37	240 45.71	119 25.21	192 27.04
Middling.....	10 3.41	35 6.67	36 7.63	66 9.30
Strict low middling.....	— —	— —	— —	— —
Good colour.....	280 95.56	474 90.29	277 58.69	489 68.87
Fair colour.....	— —	— —	— —	— —
Very light spotted.....	1 .34	42 8.00	106 22.46	186 26.20
Other off-colour.....	12 4.10	9 1.71	89 18.85	35 4.93
TOTAL.....	293 100	525 100	472 100	710 100

Prices of Pineapples for Canning.

THE maximum prices at which pineapples may be sold to canners, as fixed on 28 December 1945 (see *Crops and Markets* of February 1946), have been increased by a further 10s. per ton in each case as from 8 February 1946, and are now as follows:—

Pineapples 3 $\frac{1}{4}$ in. and larger with tops: £7 per ton.

Pineapples 3 $\frac{1}{4}$ in. and larger, without tops: £7. 10s. per ton.

These maximum prices (per ton of 2,000 lb.) are free-on-rail producer's station and are now £1 per ton higher in each case than the corresponding prices of the previous season (see *Government Gazette Extraordinary* of 8 February 1946).

Index of Prices Paid for Farming Requisites.

Year and Month.	Imple-ments.	Ferti-lizers.	Fuel.	Bags.	Feeds.	Fencing Material	Dips and Sprays.	Building Material.
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
Basis—								
1936-38...	100	100	100	100	100	100	100	100
1942.....	123	157	140	206	136	229	117	168
1943.....	144	171	154	237	152	239	127	179
1944.....	161	184	156	307	155	240	134	184
1945—								
January...	159	204	156	310	162	225	136	181
April.....	159	204	156	311	163	224	136	181
July.....	159	204	156	321	169	225	135	180
October....	159	204	146	321	166	225	135	179
1946—								
January(j)	154	204	146	318	168	227	135	169

The following is the composition of the above groups. (The items are weighted according to their respective importance) :—

- (a) Ploughs, planters, seed-drills, harrows, cultivators, ridgers, mowers, binders, hay rakes, silage cutters, hammer mills, separators, windmills, shares, land sides, mouldboards, mowers, knives, pitmans, guards.
- (b) Superphosphate, ammonium sulphate, muriate of potash.
- (c) Petrol, power paraffin, crude oil, grease, lubricating oil.
- (d) Woolpacks, grain bags, sail twine, binder twine.
- (e) Mealies, oats, lucerne, groundnut oil-cakemeal, bonemeal, salt.
- (f) Fencing wire, standards, baling wire.
- (g) Bordeaux mixture, lime sulphur, arsenate of lead, cyanogas, (cooper's sheep dip, Little's dip, Tixol cattle dip.
- (h) Corrugated iron, deals, cement, lime, flooring boards.
- (j) Preliminary.

Index of Prices of Field Crops and Animal Products.

(Basic period 1936-37 to 1938-39=100.)

SEASON (1 July to 30 June).	Summer cereals.	Winter cereals.	Hay.	Other field crops.	Pastoral products.	Dairy products.	Slaughter stock.	Poultry and poultry products.	Com- bined index.
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	
WRIGHTS.	19	13	2	3	34	6	17	6	100
1938-39.....	92	107	96	89	79	102	106	92	93
1939-40.....	86	107	77	95	115	105	106	89	103
1940-41.....	109	113	106	156	102	108	110	104	108
1941-42.....	121	134	143	208	102	131	134	145	123
1942-43.....	160	149	144	159	122	147	167	173	146
1943-44.....	169	172	137	212	122	154	182	204	157
1944-45.....	184	183	160	280	122	177	172	187	163
1945—									
January.....	184	183	177	250	122	159	173	206	163
February....	184	183	171	235	122	180	171	225	164
March.....	184	183	182	245	122	180	171	237	165
April.....	184	183	173	246	122	180	169	263	166
May.....	199	183	173	237	122	184	163	272	170
June.....	199	183	190	320	123	184	170	262	172
July.....	199	183	191	315	118	210	175	210	170
August.....	199	183	191	333	118	210	179	180	169
September..	199	183	187	372	118	210	183	165	170
October.....	199	183	189	383	118	210	187	165	171
November....	199	190	194	379	118	204	187	173	172
December....	199	190	194	341	117	204	183	202	172
1946—									
January.....	199	190	191	349	118	204	179	233	174

- (a) Maize and kaffircorn.
- (b) Wheat, oats and rye.
- (c) Lucerne and set hay.

- (d) Potatoes, sweet potatoes, onions and dried beans.
- (e) Wool, mohair, hides and skins.

- (f) Butterfat, cheese milk and condensing milk.
- (g) Cattle, sheep and pigs.
- (h) Fowls, turkeys and eggs.

CONTENTS



	PAGE
EDITORIAL	
The Seed-Potato Industry of the Union (L. J. Henning) ...	215
ANIMAL HUSBANDRY:	
Low Solids-not-fat Content of Milk in South Africa (Dr. S. W. J. van Rensburg) ...	217
Karakul Sheep (P. D. Rose) ...	229
Sale of Blowfly Spray ...	230
The Breeding Value of Friesland Bulls in South Africa (Dr. F. N. Bonsma) ...	231
Phenothiazine: A Remedy for Internal Parasites (Dr. R. J. Ortlepp) ...	249
The South African Butter Industry (Dr. C. W. Abbott) ...	251
The Weaning of Piglets at an Early Age (W. A. Verbeek) ...	271
Contagious Abortion in Horses (Dr. M. W. Henning) ...	276
FIELD HUSBANDRY:	
Crops under Irrigation for Winter Grazing by Sheep (J. S. Starke) ...	259
MISCELLANEOUS:	
Farming is a Business: II. New Methods of Farm Book-keeping (O. E. Burger) ...	214
CROPS AND MARKETS ...	277

[Photo on Cover: S.A.R. & H.]

[NOTE.—Articles from *Farming in South Africa* may be published provided acknowledgment of source is given.]

FORD'S FOR SEEDS—A. FORD & Co. (Pty.) Ltd.
AGRICULTURAL SEEDSMEN.

SEED CONTRACTORS TO THE UNION GOVERNMENT,

P.O. BOX 5701.

CATALOGUES FREE

JOHANNESBURG.

Farming Is a Business.

II. New Methods of Farm Bookkeeping.

O. E. Burger, Division of Economics and Markets.

IN a previous article in this series it was pointed out that the present-day farmer who wishes to make a success of his farming, must run his enterprise on business principles. A farming enterprise which has not been clearly planned beforehand, has rightly been compared to a watch without hands. One can go even further and say that it may be compared to a ship without compass or steering adrift on the ocean.

The old argument that the farmer is always busy out-of-doors and has no time for figures, is stale and out of date. One realizes, however, that the capable and diligent farmer is a busy man and that additional duties, such as bookkeeping, for example, should not take up too much of his time.

Consequently, the Division of Economics and Markets has, for some time, been engaged in enlightening farmers on a system of bookkeeping which will give them the best results with a minimum of labour and sacrifice. In 1940 the Division summarized these ideas in "A Bookkeeping Book for Farmers" (obtainable from the Government Printer, Pretoria, at 12s. 6d. per set).

The main purpose of this new and simplified system of bookkeeping, may be set out as follows:—

(1) The introduction of a system of bookkeeping which will be of use to every class of farmer in our country.

(2) To provide systematic self-education in bookkeeping for those people who did not have the opportunity of taking the subject at school or at college.

(3) The final elimination of what is, for the farmer, a tedious and misleading out-of-date commercial system of bookkeeping.

It is the latter point which is briefly discussed in this article.

The writer is convinced that the older generation of farmers had such a dislike for bookkeeping, chiefly because private interests offered them a system of bookkeeping which was in no way adapted to farming.

When we refer to farming as a business, we do not have in mind a commercial business. As every farmer realizes only too well, farming is an *organization* whose general character is that of an enterprise between a factory (sometimes even a mine) and a commercial business. For each of these undertakings an indispensable system of bookkeeping had to be evolved to suit its particular demands. But if either of these bookkeeping systems were to be applied, unchanged, to agriculture (with its special character and peculiarities) the result would be confusing and misleading and a waste of the farmer's precious time.

A commercial bookkeeping system makes provision for a "Ledger" in which everything of importance to the business is recorded under separate headings. This requires a great deal of attention and is essential to the merchant, but for the farmer who only wishes to know what the total income and expenditure of his farming *as a whole* amounted to over a year, it is a waste of time. Moreover, the result is often misleading, for in following the commercial practice, only cash items are entered on the accounts whilst

* The first article in this series appeared in the January issue of "Farming in South Africa."

FARMING IN SOUTH ... AFRICA

VOL. 21

APRIL 1946

No. 241

Editorial:

The Seed-Potato Industry of the Union.

NEVER before has the necessity for a stable potato industry been established so clearly as during the recent war years, and never before has there been a keener realization of the value of this crop as one of our most important sources of food.

Owing to the fairly rapid decline in productivity of this crop as a result of the ravages of virus diseases under the hot climatic conditions prevailing in South Africa, farmers in this country have always been dependent on overseas countries, especially Scotland and Northern Ireland, for new supplies of good seed potatoes to serve as a foundation for further propagation. If the productivity of seed-potatoes representing the annual plantings in the Union is to be maintained at anything like an economic level, about 5 per cent. to 6 per cent. of the plantings must be done from imported seed potatoes.

In order as far as possible to maintain the industry at a normal level of production during the war years, the Department itself, on account of shipping difficulties, not only undertook the importation of seed-potatoes from Britain, but also took active steps to ensure that the best use was made of imported seed. This was achieved mainly by encouraging farmers in suitable areas to form seed-potato growers' associations, with the result that larger supplies of government certified seed potatoes were made available under Departmental inspection. In addition, some of the imported seed was planted on suitable government land during the war years, and at the Vaalhartz and Riet River settlements it proved possible to obtain a maximum increase of tubers. The remainder of the imported tubers was made available to seed growers' associations and to private farmers who applied for supplies.

Seed-potato growers' associations have now been formed in different parts of the country and their numbers have grown from 3 in 1943 to 41 in 1946, the production of certified seed potatoes having meanwhile increased from 3,000 bags to 60,000 bags. This branch of potato farming has therefore undoubtedly become an asset to the industry as a whole and should, with a view to future extension, be placed on an even better foundation.

This development and especially the resultant availability of a product which has been standardized as far as possible, have led potato farmers to realize, more clearly than ever before, the greater economic value of certified seed potatoes as compared with that of ordinary uncertified tubers of unknown origin and productivity. Consequently the present demand for certified seed potatoes far exceeds the supply.

Farmers are beginning to learn that a tuber which looks sound to the eye does not necessarily possess good yielding properties and that sound, productive tubers can be produced only by sound parent plants.

Linlithgow

215

Financial Accounts

and Institutions

The inspection service of the Department, instituted for the benefit of potato growers' associations, therefore includes the inspection of their lands during the period of crop growth. It is an essential requirement that lands offered for inspection must be planted with potatoes of the very best and well-known origin. In order to judge such plantings on a fair basis, three inspections are made of the growing plants on the land from an early stage, followed by a final tuber inspection. Only plantings complying with the minimum inspection requirements, especially as regards diseased or virus-infected plants, are approved. All infected plants, provided only a minimum number are present, must be removed from the land in good time. During inspection, special attention is paid to factors such as trueness to type, vigour of plants, cultivation, etc., and the product certified by the Department in this way and offered for sale by associations is accompanied by a departmental certificate in every bag. For further protection of the identity of certified seed potatoes, associations supply direct to farmers only, and all bags are sealed.

In order to determine the suitability for seed-potato production of areas in which seed-potato growers' associations have already been established, on a scientific and experimental basis, and to ensure that associations offer a certified standard product to the public, the actual product as supplied by every association is annually tested by the Department in adjacent plots of one centre.

In this way associations located in unsuitable areas are identified and in course of time, eliminated as regards the production of certified seed potatoes. This will enable the Department gradually to bring about a further improvement in the quality of seed potatoes sold by associations. Moreover extended production of certified seed potatoes will, in future, take place only in the most suitable areas.

It is the duty, therefore, of every seed-potato growers' association to comply with the instructions of the Department in every respect, and to take steps to ensure the application of better methods of cultivation, the early removal of weakened and virus-infected plants, the adoption of suitable systems of crop rotation with adequate applications of fertilizer to establish and maintain soil fertility, and the effective control of diseases and pests. The producer of such certified seed potatoes must regard himself as a specialist in his field and cannot be satisfied with ordinary methods of cultivation. In due course, associations will have to pay more attention to special facilities for the proper storage of seed potatoes until such time as they are sold.

Proper sorting of seed potatoes into classes of $1\frac{1}{2}$ to 3 ounces, 3 to 5 ounces, etc., with a further increase of 2 ounces for every succeeding class, is of the utmost importance to ensure the complete satisfaction of buyers.

(L. J. Henning, Division of Agricultural Education and Research.)

Low Solids-not-fat Content of Milk in South Africa.

Dr. S. W. J. van Rensburg, Veterinary Research Officer,
Onderstepoort.

NEARLY all the nutritive value of milk is contained in the solids. In view of this and the fact that the milk solids are subject to great variations, most countries have prescribed standards to which the fat and solids-not-fat in milk must conform.

The standard laid down for the Union is contained in Government Notice No. 575 of 28 March 1930, framed under the Foods, Drugs and Disinfectants Act, No. 13 of 1929, and prescribes that "no person shall sell as milk, milk to which any substance has been added or from which any part of any of its constituents has been removed, or which contains less than 3 parts per cent. of milk fat or less than 8.5 per cent. of milk solids-not-fat".

Only a few months after this minimum standard was prescribed, a Pietermaritzburg dairyman was prosecuted for selling milk which was below the legal standard for solids-not-fat. This was made a test case in which Government officials showed that the deficiency indicated was by no means singular and that the solids-not-fat content falls below 8.50 per cent. in a large number of cases.

As a result of this case the Union Department of Public Health instructed Medical Officers of Health to suspend prosecutions of this nature for a period of five years in order to give dairymen an opportunity of rectifying the position.

In view of the fact that the period of grace expired long ago and that the milk-consuming public is now beginning to assert its right to demand and obtain clean, safe and wholesome milk, it can be assumed that the present disregard for the legal requirements will not continue indefinitely.

Notwithstanding all the statements made to the contrary, the legal standard of 8.50 per cent. for non-fatty solids is not too high, provided an honest endeavour is made by breeders and dairy farmers to eliminate all those factors which cause a depression in solids-not-fat.

Factors influencing the Composition of Milk.

The mastitis investigations carried out at Onderstepoort during the past seven years include a study of the various factors which may produce an alteration in the composition of milk. This involved regular bacteriological, physical and biochemical examinations of milk from the individual quarters of the udders of a herd of grade Friesland cows which were kept free from mastitis over a period of five years.

The object of this article is to impart the information obtained from this and from infected herds to those concerned with milk production in an endeavour to assist in removing, as far as possible, the main causes of poor quality milk and in providing the public with milk conforming in all respects to the standards prescribed by law. The factors which were shown by these investigations to have a depressing effect on milk solids are: (1) bovine mastitis, (2) seasonal and nutritional conditions, (3) stage of lactation, (4) advancing age, (5) general management of dairy cows, (6) individuality, and (7) conformation and structure of the udder.

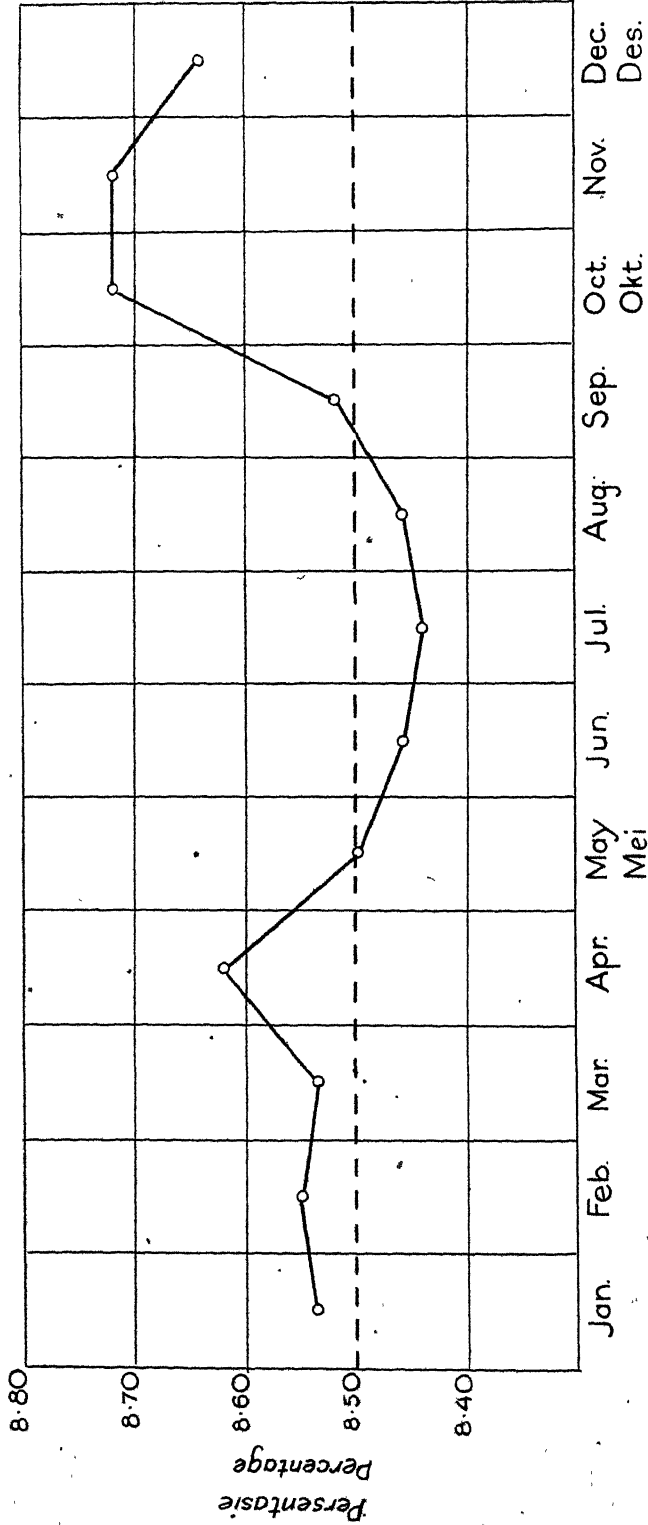


Fig. 1.—Average solids-not-fat percentage for every month of the year.

(1) Bovine Mastitis.

It is generally known that disease of the udder alters the composition of the milk on account of the pathological changes in the gland. There is a decrease in the milk solids and an increase in undesirable substances like chlorides, body cells and bacteria. Recent research has shown that these changes are even more pronounced than was at first considered to be the case. For instance, in some cases the non-fatty solid content of the milk from affected quarters dropped from 8.50 to 4.00 per cent.

A comprehensive investigation conducted by the National Institute for Dairy Research in Britain in 1936 led to the conclusion that chronic infectious mastitis was the most important factor causing a depression of the solids-not-fat content of milk. A similar investigation in South Africa would probably yield the same result, since it has already been shown that the disease is just as prevalent in this country as in Great Britain.

Up to the present there has been an unfortunate tendency among officials and dairymen in South Africa to regard the mastitic cow as part and parcel of the average dairy herd, and milk containing mastitis bacteria and all the other undesirable products from diseased udders has been regarded with the same indifference as milk deficient in non-fatty solids.

This complete disregard of some of the important regulations prescribed to safeguard the consuming public was, no doubt, inspired to a large extent by the widespread prevalence of the disease, and by the difficulties experienced in diagnosing and treating it. During recent years, however, very reliable tests which enable veterinarians to diagnose the disease with accuracy under field conditions, have been evolved. Effective measures for control and prevention have been recommended, and good progress has been made in the search for a reliable cure. Therefore in future there should be no reason for selling milk from diseased udders, and the increasing demand for clean and safe milk will probably lead to considerable tightening up of the regulations in this respect too.

(2) Seasonal and Nutritional Conditions.

The seasonal variations in the solids-not-fat content of milk have been thoroughly investigated in Europe and the United States of America. The consensus of opinion in those countries is that there is an appreciable increase in the solids-not-fat percentage during winter and a corresponding decrease in summer. It was accordingly assumed that the same rule would apply in South Africa. The complete results obtained from the mastitis-free herd for the five years, however, revealed that the position was exactly the opposite.

The average percentage of solids-not-fat and the number and percentage of samples that were below 8.50 per cent. in every month of the year are shown in Table I.

The variations shown by the solids-not-fat content from month to month are further illustrated by the graph in Figure 1.

It will be observed in Table I and Fig. 1 that the average solids-not-fat percentage for the clean herd was well above the standard during the first four months of the year, but that with the onset of winter there was a pronounced drop which reached its lowest level (8.44 per cent.) in July. The average was continually below the legal limit during the three severest winter months (June, July and August). From September onwards there was a rapid rise and the highest percentage (8.72) was obtained in October and November. Other biochemical tests carried out at the same time confirmed that the milk was abnormally poor in quality during the winter months.

TABLE I.—*Seasonal Variations.*

Month.	Number of samples tested.	Number below 8.50 per cent. S.N.F.	Percentage below 8.50 per cent. S.N.F.	Average S.N.F. percentage.
January.....	132	58	43.9	8.54
February.....	128	51	39.8	8.55
March.....	108	43	39.8	8.54
April.....	120	48	40.0	8.62
May.....	120	63	52.5	8.50
June.....	128	64	50.0	8.46
July.....	132	67	50.8	8.44
August.....	132	71	53.8	8.46
September.....	132	51	38.7	8.52
October.....	132	34	25.8	8.72
November.....	112	27	24.1	8.72
December.....	100	32	32.0	8.64

In Europe and America the seasonal variations were at first attributed to the difference in environmental temperature, but many now believe that nutrition plays a more important rôle.

Normally, feeding is not supposed to influence the milk solids. For instance, it is impossible to improve the quality of the milk of a cow receiving an adequate ration by increasing the ration. It is, however, very essential that the dairy cow should receive a ration which is sufficient for both the maintenance of her own body and for milk production. In the absence of sufficient digestible and nourishing food the animal starts using its own reserves for itself and in the lactating animal the first effects are seen in both the yield and composition of the milk. Those essential constituents in the blood from which milk is formed are under such conditions diverted from their normal destination in the udder to increase metabolism for the maintenance of body heat and energy.

Owing to the severe winter conditions in Europe and North America the proper feeding and nutrition of dairy cows has been brought to a much finer pitch in those countries than in South Africa, and one of the greatest concerns of the dairy farmer there is to make provision in summer for an adequate supply of nourishing and digestible foods, such as succulents, mainly silage, and balanced concentrates, for the winter. Pastures in South Africa generally have a much lower nutritive value than those in Europe and America, and have their highest protein value and digestibility only for a short period of six to eight weeks during the time of rapid spring growth. It is significant that this period coincides exactly with that (October and November) in which the quality of the milk of the cows in this experiment was far superior to that obtained at any other time of the year.

The high quality of the milk produced by these grade cows in the two months when nutritional conditions were at the optimum level suggests that the ordinary South African dairy cow is not inferior to her prototype in other countries, and that she has great potentialities for producing high-grade milk, provided she is maintained under conditions of good health and nourishment. Under present conditions, however, she is all too frequently expected to yield good quality milk on a plane of nutrition which is subnormal for 9 months every year.

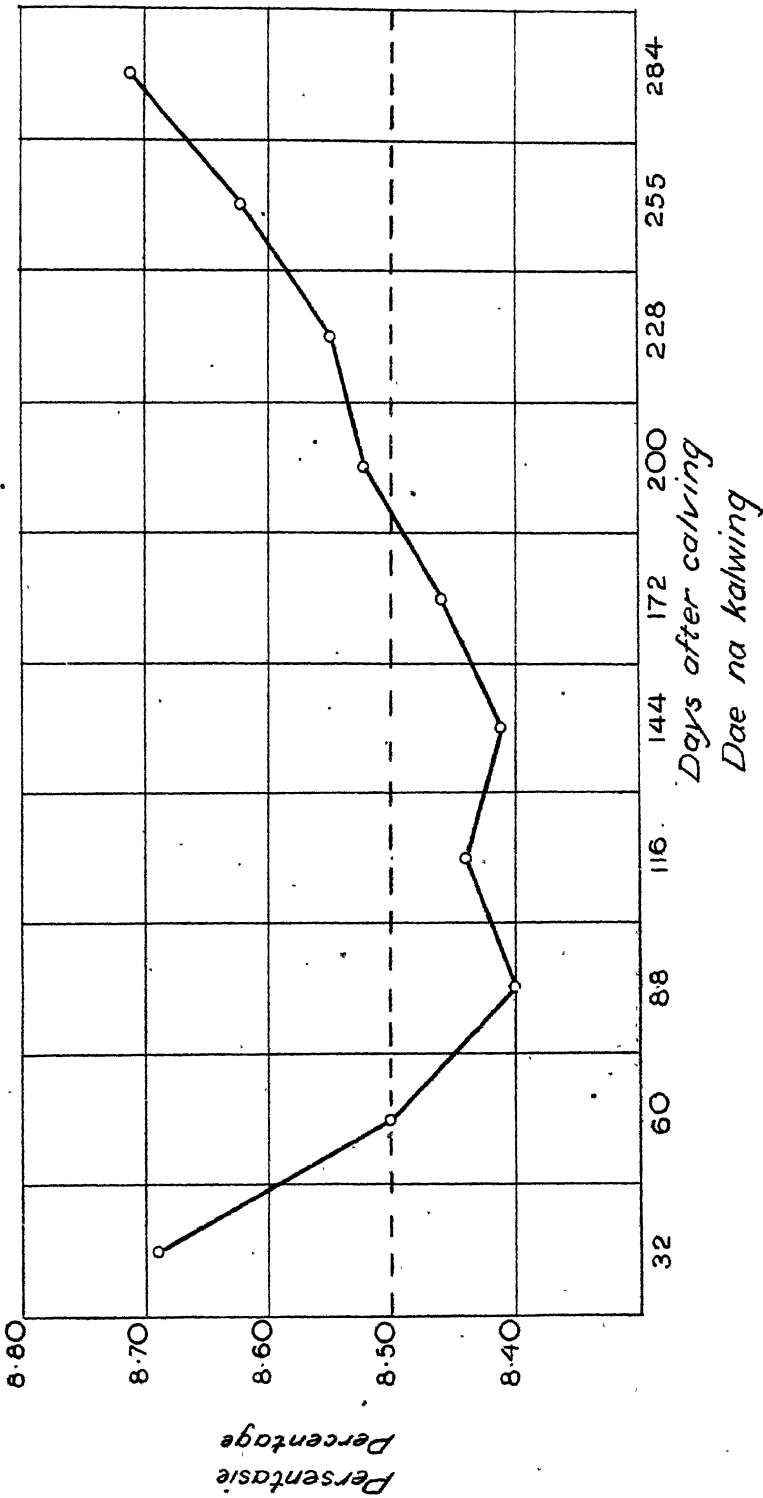


FIG. 2.—Average solids-not-fat percentage at four-weekly intervals after calving.

(3) Stage of Lactation.

The non-fatty solid content of the milk of individual cows does not remain constant throughout the lactation period. The variations which may occur, are shown in Table 2 and in the graph in Fig. 2.

TABLE 2.—*Variations due to stage of lactation.*

Days after calving.	Number of Samples tested.	Number below 8.50 per cent. S.N.F.	Percentage below 8.50% S.N.F.	Average S.N.F. percentage.
32	132	38	28.8	8.69
60	132	55	41.7	8.50
88	132	77	58.3	8.40
116	132	68	51.5	8.44
144	132	71	53.8	8.41
172	132	65	49.2	8.46
200	132	59	44.7	8.52
228	132	51	36.6	8.55
256	132	49	37.1	8.62
284	132	34	25.8	8.71



FIG. 3(a).—Cow 7919.

The solid-not-fat content of the milk is high during the first month after calving, but it declines rapidly, and in the experimental animals it was below the legal limit from the third to the sixth month.

It is obvious that if all the cows in the herd calve at the same time, the solids-not-fat content of the bulk milk will be below the standard for 3 to 4 months of the year. Moreover, if this period of depression caused by the stage of lactation happens to fall in the winter months, as would occur if all cows were to calve between February and April, the combined effect of season and stage of lacta-

tion will cause a still more pronounced deterioration in the quality of the milk during winter. Therefore, unless the winter depression in South Africa is overcome by more generous feeding, the only manner in which the dairyman will be able to maintain his milk supply at the required standard is to arrange his breeding programme in such a way that cows either come into milk or are in an advanced stage of lactation during the winter months.

The increase in solids-not-fat content during the latter part of lactation depends on the animal being pregnant at that time. The non-fatty solid content of non-pregnant cows is not maintained at such a high level as that of pregnant animals. In fact, it tends to show a decrease rather than an increase towards the end of lactation.



FIG. 3(b).—Cow 7919.

The effect of pregnancy in raising the milk solids focuses attention on the important rôle played in the production of poor quality milk by diseases such as contagious abortion and sterility, and by the wilful prolongation of lactation practised by some dairy-men who intentionally withhold service from cows in order to keep them in milk as long as possible. It is therefore essential for the production of good quality milk that dairy animals be kept free from disease of the genitalia as well as of the udder, and that they be served regularly and according to a definite programme which aims at counteracting as far as possible the effects of the various factors having an adverse influence on the quality of the milk.

(4) Age.

The records of the mastitis-free herd over four lactations yielded the following average solids-not-fat content for each lactation:—

First lactation	8.76 per cent.
Second lactation	8.80 per cent.
Third lactation	8.62 per cent.
Fourth lactation	8.54 per cent.

Except for a slight rise after the second calving, there was thus a very definite decline in milk quality from the first to the fourth

lactation. This deterioration of the udder and of the milk was confirmed by the other biochemical tests, and it is in accordance with the findings of investigators overseas.

No satisfactory explanation for this decline in milk quality with advancing age in a cow that has been kept free from disease of the udder, has as yet been given. Assuming, however, that the cows are in good health and well nourished, the search for the primary cause must be directed to the udder itself. Regular analysis of the milk and clinical examination of the udders in this investigation suggest that there is a gradual increase in fibrous tissue at the expense of the normal glandular tissue which has to synthesize the milk in the udder. The result of this would be that with advancing age the



FIG. 4.—Cow 7922.

normal selective absorption and synthetic powers of the gland cells would be reduced, and instead of the cells performing their normal function of selecting and synthesizing the constituents of milk they may allow some of the constituents of the blood to pass into the milk unchanged.

(5) General Management.

With the udder, as with any other part of the body, it is not possible to prevent completely the ravages of advancing age. To a certain extent degeneration of the udder is therefore unavoidable and must be regarded as the natural result of the "wear and tear" process continually going on in the gland. There are, however, conditions which, if permitted, will greatly intensify the normal deterioration of the udder and cause a more rapid decline in the quality of milk secreted. These are, for instance, prolonged lactation, a too short dry or rest period, incomplete milking, slow milking, careless handling, disease and injuries of the udder, etc. In fact, they can all be classed in one category, namely, "bad management".

One must remember the basic fact that an unnatural strain is placed on the mammary gland of the modern dairy cow by demanding that it should be maintained in an almost continuous state of high functional activity from the time the cow first calves until she dies. The prevailing impression appears to be that the cow must be kept

in milk as long as possible and that the dry period must be as short as possible. No consideration is given to the fact that the secretion of milk involves a continuous and intensive process of breaking down and building up of gland tissue. Therefore the tendency to reduce the dry period to a minimum and not to allow the udder tissues sufficient time for regeneration between the different lactations must inevitably lead to more rapid decline.

Incomplete milking not only causes an immediate loss of milk, but its ultimate effects are even more serious in that the milk which is left in the quarters at each milking must contribute very largely to udder deterioration. It means that a certain pressure is always maintained in the secretory portion. It follows that degeneration will be more rapid in an udder in which the alveoli and tubules are constantly labouring under pressure than in one which is completely emptied and allowed a brief period of rest after each milking.

Slow milking is conducive to incomplete milking. The "letting down" of milk is due to a nervous reflex. Stimuli from the nerves of the skin of the udder and teats act on the pituitary gland causing it to secrete a hormone, oxytocin, which produces contraction of the smooth muscle fibres of the alveoli and tubules of the udder, with the result that the milk is forced out into the larger tubes and cisterns.



FIG. 5.—Cow 7909.

It takes about 40 seconds for the oxytocin to get to the udder after it has been secreted by the pituitary gland, and, when once stimulated, this gland continues secreting the hormone for about seven minutes. It follows that unless the whole process of milking can be completed within 7 minutes, some of the milk will be retained in the tubules. The need, therefore, of having properly trained persons or an efficient machine to do the milking is obvious.

(6) Individuality and Hereditary Factors.

It is a well-known fact that cows free from disease and maintained under identical conditions may show considerable individual variation in the composition of their milk, some persistently yielding

milk falling below the prescribed standard for milk solids. In the absence of any known environmental condition such as disease, stage of lactation, malnutrition, etc., to account for this phenomenon, it must be accepted that the production of inferior milk by certain animals is due to some inherent and probably hereditary characteristic of the individual animal.

Notwithstanding the fact that 30 per cent. of the cows in the experimental herd persistently secreted milk which was below the legal standard, the average solids-not-fat content of the bulk milk from the herd was well above the limit. While, therefore, the presence of a small proportion of poor producers may not have an appreciable effect on the solid content of the bulk milk, a large percentage of such animals may depress the non-fatty solids to a point below the accepted limit.

Hereditary weakness of this nature can and should be corrected by proper breeding. Here one must emphasize the importance of regularly testing every cow in the herd and of seeing the records of cows that are offered for sale. Testing should not be confined to recording the milk yield and the butterfat percentage, but must include the solids-not-fat percentage, the determination of which does not entail much extra work. There is too great a tendency to ignore the fact that milk contains other solids besides fat. Yet the calorific value of non-fatty solids is nearly 15 per cent. greater than that of the fat. This fact and the knowledge that the percentage solids-not-fat is subject to considerable variation, warrants far more attention being paid to this portion of the constituents of milk than it has received in the past.

(7) Conformation and Structure of the Udder.

The study of the composition of milk from the individual quarters of the udder, combined with regular clinical examination of the mammary gland of every cow in the experiment, has given valuable information on the extent to which the conformation and structure of the udder may influence the composition of the milk. It was found that the two hind quarters of the udder are superior to the two fore quarters as regards both yield and composition of the milk. They produced approximately 60 per cent. and the fore quarters about 40 per cent. of the total yield. The average solids-not-fat content of the four quarters over the whole period was:—

Left fore quarter	8.52 per cent.
Right fore quarter	8.54 per cent.
Left hind quarter	8.58 per cent.
Right hind quarter	8.58 per cent.

In some cases, however, quite significant differences in the composition of the milk of the different quarters of the same cow were found. This is illustrated by the following average solids-not-fat percentage of the quarters of the two cows, namely, Nos. 7919 and 7922. For the purpose of comparison, the records of the cow (No. 7914) which scored the highest number of points in the experiment for conformation and structure of the udder (Fig. 6.), are also shown:

Cow.	Right fore.	Right hind.	Left fore.	Left hind.
7919.....	8.71	8.73	8.69	8.76
7922.....	8.67	8.77	8.68	8.83
7914.....	8.99	9.00	9.01	9.00

The udders of the first two cows are illustrated in Figs. 3 and 4. Cow 7919 has a very badly shaped udder with extremely poor development of the fore quarters which, instead of being placed in front of the hind quarters are on the sides of the latter, so that the four teats are situated almost in a straight line extending from side to side. The two fore quarters together in this case produced only 21.4 per cent. of the total milk yield. In cow 7922 the two fore quarters occupy their proper position, but as in 7919 they show a marked underdevelopment of the glandular tissue, with the result that the teats are drawn up. This udder has the appearance of one affected with chronic mastitis though it has never been diseased, and the glandular tissue of all four quarters is soft and pliable.

To appreciate the influence which conformation and structure of the udder may have on the solids-not-fat content of the milk, one must recall that all the important constituents of the milk solids, namely, fat, sugar and proteins, have to be synthesized in the udder. As it gradually fills with milk, the intramammary pressure rises, and on account of its elasticity the udder expands. Any obstruction to this expansion, such as may be offered by excess of fibrous tissue or a firm, tight skin, will unduly increase the intramammary pressure, which in turn will tend to suppress the synthesis of the milk solids in the alveoli. Consequently, the milk secreted will be deficient in solids.

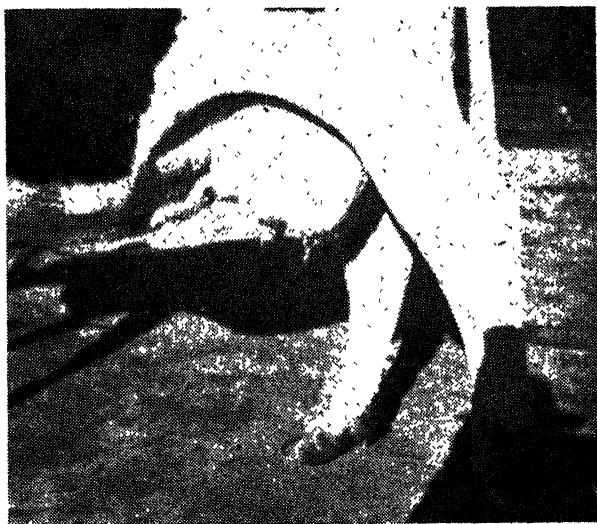


FIG. 6.—Cow 7914.

The Ideal Udder.

In view of the fundamental facts the following characteristics can be prescribed as essential for the ideal udder, both as regards quantity and quality of the milk to be produced.

Symmetry.—This is judged by viewing the udder from all sides and noting the development of the individual quarters with special reference to their relation to the udder as a whole.

Attachment.—The rear attachment of the udder should extend well up behind, while the fore quarters should join the abdomen well forward instead of ending abruptly as for example in cow 7909 (Fig. 5).

Evenness or smoothness.—This is indicated by the fulness of the udder and the development of the glandular tissue. It is characterized by the absence of indentations or sulci between the quarters and the absence of roughness or corrugations on the surface of the gland. Fig 5 (cow 7909) shows a good example of a poor udder on account of the deep sulci between the quarters which give the impression that the udder is "all teats and no gland".

Skin.—The ideal skin should be thin, elastic and loosely attached to the gland, allowing it to distend freely on filling with milk.

Yieldability.—This is defined as the degree of responsiveness of the udder to pressure applied to it from without, and is an indication of the elasticity of the gland. Softness and pliability of the udder are characteristic of an abundance of glandular tissue, while a firm hard consistence is evidence of excessive fibrous tissue and is typical of "meaty" or "fleshy" udders.

Collapsibility.—This is indicated by the degree to which the udder collapses or shrinks after it has been milked out. The good elastic udder should "shrink away to nothing" and hang in folds, and its texture should feel soft and spongy after it has been completely emptied.

Teats.—These should be well spaced, hang on an even plane and, while large enough to permit of convenient milking, they should not be so large as to occupy space which should be filled by glandular tissue as in cow 7909 (Fig. 5).

Dairymen and breeders should not only be acquainted with these points of the ideal udder, but should also train themselves by regular practice to "get the feel" of the good udder. This will enable them not only to detect evidence of disease in the udder, but also to judge by palpation whether it is capable of yielding a good supply of rich milk or not. The feel of the udder is of far greater importance than its outward appearance and size. Such manual examination must, however, never be carried out on a distended udder, but only after it has been completely milked out.

Farming is a Business:—

[Continued from page 214.]

non-cash items (such as labour, cost of animal and mechanical power, etc.) are not included. In fact, the ordinary commercial system makes no provision for such cost items.

Consequently, owing to its nature, diversified farming should be regarded and treated as an indivisible unit. In other words, the result of a year's farming must be calculated for the *farming enterprise as a whole*. The farmer who is not interested in an analysis of the various branches of his farming or in costing, should not be burdened with a long series of separate accounts. On the other hand, the farmer who wishes to undertake such an analysis must avoid the ledger systems; what he requires is proper cost statements. Such a farmer must realize from the outset that he requires professional assistance if he wishes to avoid disaster in such an ambitious attempt. He must remember that a careful and effective analysis of the various branches of his enterprise may result in great financial gain; consequently he will be able to afford the services of a part-time or full-time bookkeeper. On the other hand, faulty analysis of the branches of a business by the farmer himself, may result in financial ruin.

In a following article more details will be given in connection with the new method of farm bookkeeping and it will be explained how the farmer can become more familiar with his bookkeeping book.

Karakul Sheep.

P. D. Rose, Senior Lecturer in Sheep and Wool, Grootfontein College of Agriculture, Middelburg, C.P.

NUMEROUS enquiries concerning the prospects of Karakul sheep farming are continually received from all parts of the Union, as well as from the Protectorates and other countries.

All want to know:—

- (1) whether the breed is hardier than any other;
- (2) whether the Karakul sheep will thrive in this or that district;
- (3) whether these sheep are prolific or shy breeders;
- (4) whether they are susceptible to fly strike, and immune to internal parasites;
- (5) where they can be obtained, and at what cost; and
- (6) what future the industry holds.



A Karakul Lamb.

The following information should therefore be of interest to prospective Karakul farmers. The natural habitat of the Karakul sheep is in semi-arid country, but experience has shown that it will do well on any type of country where the merino or Blackhead Persian can be maintained in good health.

It is a hardy sheep and an excellent forager, but it will not thrive in the desert as some people would like to believe. It is as susceptible to internal parasites as any other breed, but blowfly trouble is comparatively rare.

The Karakul ram is an exceptionally vigorous worker, and the ewes will mate at any time of the year, provided of course that conditions are not too unfavourable. In a mutton sheep, the fat tail and rump are distinct disadvantages, but the extra weight and gains made by the Karakul in comparison with the Merino and Blackhead Persian must be counted in its favour. The fact, too, that the majority of the ram lambs are slaughtered at birth for pelt production, and thus do not require maintenance, enables the

owner to keep a greater number of ewes and so obtain more lambs in a given time, than is possible from other breeds. However, the contention that the Karakul ewe will produce two lambs in one year should be regarded as the exception. Normally it is possible to get three lambs in two years.

With regard to purchase it must be pointed out that there is an embargo on the export of Karakul sheep from South-West Africa. There are limited numbers of pure-bred Karakul sheep in the Union, and prices are very high. An average price of £50 for rams and £35 for ewes has been obtained, over a period of years, for sheep sold by the Grootfontein College of Agriculture. Information concerning the price from private breeders can be obtained from the Secretary, South African Karakul Breeders Company, Upington.

The breeds which "nick" best with the Karakul, for pelt production, are the Blackhead Persian and fat-tailed breeds indigenous to South Africa. Woolled sheep should be avoided at all costs in crossing. First-cross pelts are however of little commercial value, although skins with good lustre, curl and pattern are obtained from third and higher cross lambs.

The present value of the industry is reflected by the following figures:—

Skins valued at £750,000 were exported from South Africa last year. The average prices for large consignments of pelts, exported through the Karakul Breeders Co., have been in the vicinity of from 30s. to 35s. in recent months. Individual owners have obtained an average of 43s. per pelt.

Many people, however, regard the Karakul pelt as a luxury article directly dependent on the fickle whims of fashion, and within the reach only of the very wealthy.

While it is always dangerous to predict the future, it seems, nevertheless, reasonably safe to assume that good pelts will always find a ready sale, particularly when it is borne in mind that the supply of valuable and beautiful furs from wild animals is declining rapidly, while the demand for fur has been increasing steadily for many years. Better manufacturing methods and more creative styling have brought into prominence a very fine range of articles made from Karakul pelts. These articles to-day find a ready sale in most countries, and are utilized by all classes, in some form or another, because they are useful, durable and distinctively beautiful.

Thus one may reasonably conclude on a note of optimism with regard to Karakul sheep farming.

Sale of Blowfly Spray.

As from 1 June 1946 Blowfly Spray will be available in one (1) gallon and five (5) gallon drums at 6s. and 23s. respectively. These prices include the drums, which become the property of the buyer of the spray and will not be accepted for refilling. Possessors of 25 to 45 gallon drums may forward these, railage paid, to the Director of Veterinary Services, Onderstepoort, Pretoria North station, to be refilled. The name and address of the sender must be painted clearly on the drums. No unmarked drums will be received. The price of Blowfly Spray in such owners' drums is 3s. 6d. per gallon.

The Breeding Value of Friesland Bulls in South Africa.

Dr. F. N. Bonsma, Department of Animal Husbandry, Agricultural Research Institute.

DURING the past 4 years the Department of Animal Husbandry of the Agricultural Research Institute has been engaged in an extensive study of the breeding value of Friesland bulls used in the pedigree herds of South Africa.

There is little doubt that the leading Friesland herds in the country have reached a very high level, both in conformation and production. This is mainly due to the very high standard of excellence demanded by the Friesland Breeders Association of South Africa for stock imported from Holland. As a result of these regulations only bulls and females of excellent quality, breeding and production were eligible for importation into South Africa. Consequently, some of the best-bred bulls in Friesland were imported during the 20 years prior to 1938. Among the large number of animals which were introduced into South Africa there were several of the best known preferent sires from Holland. Owing to the re-occurrence of foot and mouth disease in Holland an embargo was imposed upon the introduction of stock from infected areas, and further importation was prohibited in 1937. This was followed by a complete breakdown in export during the six years of war. The latest news from Friesland indicates that the position of the pedigree herds is fortunately more favourable than at first anticipated. According to the information received from the Secretary of the "Friese Rundvee Stamboek" it seems that the possibilities of importing fresh blood in the near future will largely depend upon the availability of shipping facilities.

Very few of the bulls imported before the war are still alive or in use. The majority of sires used in our pedigree herds at present are South African bred bulls, the descendants of pure imported stock.

Since the selection of animals for high milk production cannot be divorced from the selection for conformation and constitution, particularly in the breeding of pedigree dairy stock, the true breeding value of a bull is determined by his ability to transmit these characters to his progeny. The present investigation was, however, primarily concerned with a study of the breeding value of Friesland bulls for milk production and butterfat percentage. Wherever it was practicable, as many as possible of the progeny of a number of bulls were inspected and judged for conformation and type. In addition, an analysis was made of the available official score cards for conformation of the male and female progeny of a sire in order to establish some measure of the standard of excellence of his progeny.

It is felt that the information obtained in this investigation should be made available to breeders of pedigree and grade Friesland stock as it may be of considerable value to them. In order to eliminate any advantages which certain breeders may gain from this information for advertising purposes, it has been considered advisable to publish only the analysis of bulls which have been dead for some time. These results will appear from time to time in "Farming in South Africa."

The Progeny-Testing of Sires.

Before dealing with the results obtained from the study of individual bulls, it is necessary to discuss briefly a few of the underlying principles of "progeny testing" and the difficulties associated with the interpretation of results.

It is generally accepted and genetically sound that the only reliable method of evaluating the animal's genotype and breeding value is by means of the progeny test. In dairy stock the production records of the ancestors serve as a valuable guide to breeders, but these are a poor and unreliable indication of the transmitting qualities of the animal concerned.

For example, the ability of a cow to be a heavy producer is not necessarily associated with a hereditary transmitting ability for this character. Furthermore, the pedigree of an animal which merely indicates the names of its ancestors for a number of generations, is in itself of little or no value. Pedigree alone is not sufficient; it must include all the possible information available with regard to the "performance" of all the ancestors of the animal. In the selection of a sire, the pedigree, provided it includes as much information as possible in regard to the breeding value of the animals appearing in the pedigree as determined by the progeny test, can become a very valuable guide to breeders.

The aim of the progeny test is to assess the transmitting ability of a sire, and is based upon the milk and butterfat production of his daughters in comparison with that of their dams. The various factors which have to be taken into consideration in using milk production records for the purpose of assessing the breeding value of sires, are summarized by Edwards and Smith as follows:—

"In the proving of a dairy bull the lactations of his daughters constitute the foundation, and as any influence affecting these lactations affects also the progeny test, a system of treating them that takes cognizance of environmental and hereditary influence has to be evolved before comparisons among performances of different sires can be rationally made. The following questions amongst others have to be considered: what is to be defined as a lactation; can records made under different systems of feeding and management be compared; can a lactation made in the heifer year be compared with one made at a later stage; can a bull proved by records made by twice-a-day milking be compared with one whose daughters are milked three times a day? In addition, we have to decide upon the number of daughters necessary to give a reliable indication of their sire's milk-transmitting ability and also upon the possible effect of the level of their dams' production."

The answers to the above question in so far as the matter concerns the methods employed in the present investigation, may be briefly explained as follows.

Under the official Government milk-recording scheme controlled by the Division of Dairying of the Department of Agriculture, the length of lactation is limited to 300 days. The official standard 300-day lactation period therefore practically eliminated the necessity of any corrections for length of lactation. Lactations of 270-300 days duration were, however, also included. In cases where the lactation period was shorter than the standard 300 days, correction factors were employed in order to have a uniform basis of comparison.

THE BREEDING VALUE OF FRIESLAND BULLS IN SOUTH AFRICA.

In only a few cases was it necessary to make corrections for length of lactation. The correction factors given in Table I calculated from the data of Turner, Ragsdale and Brody (1923) were used.

TABLE 1.—*Correction factors for length of lactation.*

Days.	Factor.
270-272.....	1.080
273-277.....	1.070
278-282.....	1.055
283-287.....	1.040
288-292.....	1.026
293-297.....	1.013
298-300.....	1.00

One of the most important factors influencing total milk yield during any one lactation is that of age. Numerous investigators have shown that there is a marked increase in milk yield with successive lactations until productive maturity is reached. In order to make reliable daughter-dam comparisons the production must be calculated on a uniform age basis. This was done by the use of age-correction factors, which made it possible to work out the production on the same age level for all cows.

Several workers in the United States of America, Great Britain and Holland have established age correction factors for milk yield for Friesland cows [Gowen (1924) Sanders (1927) Groeneveld (1939)]. It seems reasonable to assume that there should be a very close hereditary similarity between pure-bred Frieslands in South Africa and in Friesland on account of the large number of stock imported from Holland, while from a hereditary point of view there appears to be little objection to the use of age-correction factors employed by Groeneveld (1939). It was nevertheless felt that, in view of the vast differences in the environmental conditions between Friesland and South Africa, the age-correction factors as determined for Friesland might probably not be applicable to South African conditions. A preliminary investigation was therefore carried out with the object of establishing age-correction factors under South African conditions [Bonsma (1943)]. The results proved that there was a marked difference in the trend of increase and decrease of

TABLE II.—*Age-correction factors for the milk production of Friesland cows.*

Age.	Lactation.	Correction Factor.
2.....	1st	1.0
3.....	(a) 2nd (b) 1st	(a) 1.20 (b) 1.074
4.....	(a) 3rd (b) 2nd	(a) 1.35 (b) 1.27
5.....	4th	1.45
6.....	—	1.48
7.....	—	1.46
8.....	—	1.43
9.....	—	1.40
10.....	—	1.36

milk yield with increase in age between Friesland cows in South Africa and Friesland cows in Friesland. The average age-correction factors as established for South African conditions and tabulated in Table II were used in the present investigation and all lactations were converted to a common 2-year-old basis.

Where a cow had more than one completed lactation, the average of all the corrected records was taken as the 2-year record, of the cow. Dam-daughter comparisons for milk production were made between the average calculated 2-year-old yields. The average butterfat percentages for all available lactations of each cow were used in the dam-daughter comparisons for butterfat percentage.

One of the greatest difficulties in evaluating a sire on the basis of the milk yield of his daughters is the fact that the same level of production cannot be expected on all farms. This is particularly the case in a country like South Africa with its wide range of environmental and nutritional conditions.

The system of farming practised, climatic conditions such as total rainfall and its annual distribution, maximum and minimum temperatures, and the type of soil and natural vegetation on any particular farm all have a very marked influence upon the limits of production of dairy cows. In determining the age-correction factors for Friesland cows under South African conditions the writer even established appreciable differences in the life production curves of cows for different parts of the country, which could be attributed primarily to environmental agencies.

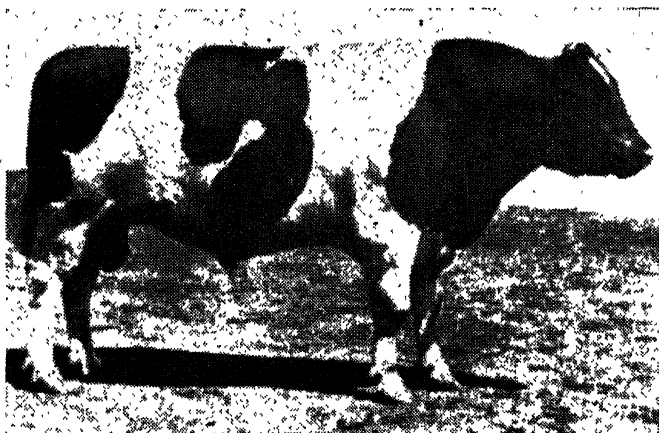
It is therefore necessary to bear in mind the conditions under which the daughters of a bull have been tested. Lush (1933) points out that the greatest vulnerability of the progeny test lies in the possibility that daughters and dams may not have been tested under the same conditions. Nutritional conditions may vary very considerably in different herds and unfortunately there is no reliable method of adjusting milk records to compensate for different levels of feeding. In order to obtain more direct information on the farming systems practised and the prevailing nutritional conditions under which milk production records were obtained, as many as possible of the Friesland herds in which bulls included in the present investigation were used, were visited.

The number of available dam-daughter comparisons obviously influences the accuracy of the progeny test. The more tested daughters available, the more accurately can a bull's breeding value be assessed. Edwards (1932) concludes that six unselected daughters are the minimum number necessary for a reasonably accurate estimation of a sire's breeding value. Lush (1931) states that there is no definite number of daughters above which a test can be regarded as certainly accurate and below which the data are to be considered inadequate, but "if a definite number must be adopted in order formally to define what a proved sire is, perhaps the number five, adopted by the Bureau of Dairy Industry, is as practical as any". In the present investigation only bulls with at least 10 unselected dam-daughter comparisons were included. The dam-daughter comparisons were also statistically analyzed for the significance of the differences between the milk yield and butterfat percentages of the daughters and their dams. The milk yield and butterfat percentages for all dam-daughter comparisons for each bull have been plotted graphically. The production of the daughters is measured along the

horizontal line, and that of the dams along the vertical line. The point corresponding with the level of production of the dam along the vertical line and that of the daughter along the horizontal line is plotted and numbered. The same procedure is followed in the case of percentage butterfat. By drawing a diagonal line across the graph from the lower left-hand corner to the upper right-hand corner it is possible to ascertain at a glance the relative increase or decrease in production or butterfat percentage of the daughters as compared with their dams. The points located to the right side of the diagonal line indicate an increase, whereas those on the left-hand side denote a decrease in production by the daughters as compared with their dams.

Analysis of Bulls.

(1) Bertus 8664/7 (16877. F.R.S.)



Bertus.

Date of Birth: 11 March 1927.

Died: 8 June 1938.

Breeder: Jan Wassenaar, Jelsum, Holland.

Owner: J. D. van Niekerk, Brakfontein, Bedford, C.P.

Score: 87 points in Holland.

Bertus was declared *preferent B* in Holland in 1934. He was imported by the late Mr. J. D. van Niekerk in September 1929.

Pedigree.

		{ Roland XVIII, 10934
	{ Anna's Roland, 13694.....	{ Kleiterp XI, 33910.
Athleet 15272, Pref. A.....	{ Bertha Roland, 50746.....	{ Tiersma's Roland, 12260.
		{ Bertha 29222.
		{ Gerard 6308, Pref. B.
	{ Gerard XXXII, 11923.....	{ Schermer XIV, 18577.
Gerard Bertha III, 60793.....	{ Gerard Bertha, 45385.....	{ Gerard 6308, Pref. B.
		{ Pel Bertha, 30765.

Production Records.

Age.	Milk, lb.	B.F. %.	Days.
60793—			
2.....	9,213·6	3·85	318
3.....	10,430·6	3·88	287
4.....	11,376·2	3·70	295
5.....	11,677·6	3·67	284
6.....	11,895·4	3·54	287
7.....	13,431·0	3·65	327
8.....	10,623·8	3·39	320
10.....	9,213·6	3·85	318
50746—			
2.....	6,692·4	3·86	317
4.....	11,475·2	3·58	326
5.....	11,022·0	3·59	302
6.....	12,078·0	3·82	326
7.....	7,530·6	3·82	270
8.....	9,495·2	3·57	292
45885—			
2.....	9,552·4	3·69	326
4.....	11,649·0	3·31	295
5.....	11,514·8	3·26	243

From his pedigree it will be seen that Bertus is a son of the well-known preferent sire Athleet 15272 and is line-bred to the famous preferent sire Gerard 6808. According to the preferent report issued in 1934 by the "Provinciale Commissie voor de Veefokkerij in Friesland" Bertus left 64 male and 74 female progeny in Holland which were registered in the Calf Book. With regard to his progeny the comments of the Commission can be summarized as follows:—

Bertus bred well for conformation; his influence on the milk yield was excellent and very favourable on the percentage butterfat of his daughters. His male progeny showed very good quality and character with excellent top-lines and spring of ribs. The heads were good, although sometimes slightly narrow. His daughters were of outstanding milk type.

In South Africa approximately 234 calves were sired by Bertus (S.A. Friesland Journal August 1938).

Bertus was extensively used in the herd of Messrs. van Niekerk Bros., Brakfontein, during the period 1930-1938. He was also used on a number of cows in the Melrose herd of the late Mr. Warick Evans.

Analysis of Data.

From the available production records it was possible to analyze 77 daughter-dam comparisons. The majority of the milk records of both the daughters and their dams were made under the prevailing environmental conditions at Brakfontein. The environmental conditions found in the Bedford area are amongst the most favourable for Friesland cattle in South Africa. The feeding and management of the Brakfontein herd has been maintained at a high level of efficiency for many years and consequently it is possible to draw reliable conclusions as to the breeding value of Bertus 8664.

Daughter-dam Comparisons.

A comparison between the average corrected two-year production of the available 77 daughters and their dams is shown in the following Table.

Milk Yield and Butterfat Percentage.

Daughters (77).	Dams (71).	Average increase or decrease in production of daughters.	Percentage of daughters which show an improvement on their dams.	STATISTICAL SIGNIFICANCE.	
				P = .05.	P = .01.
9005.5 lb.	7947.0 lb.	MILK + 1058.5 lb.	YIELD. 72%	Sig.	Sig.
3.79%	3.61%	BUTTERFAT PERCENTAGE. +0.18%	67%	Sig.	Sig.

The distribution of the individual dam-daughter comparisons is graphically shown in Figures 1 (a) and (b).

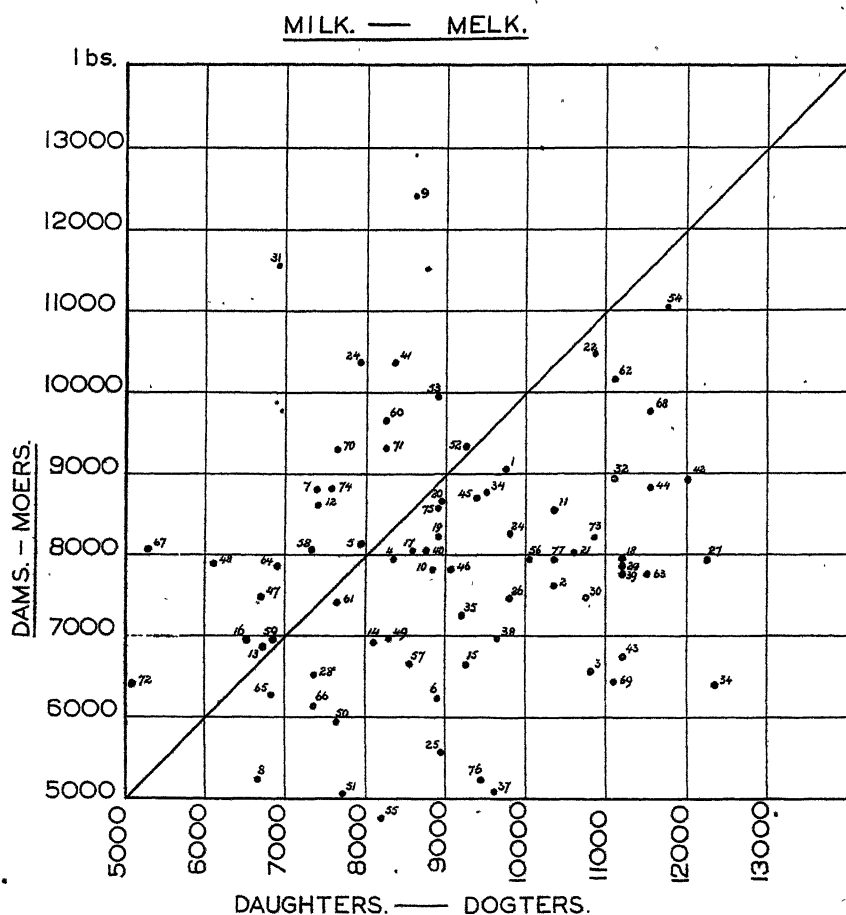


FIG. 1 (a).—Daughter-dam comparisons for milk yield on 2-year-old basis.

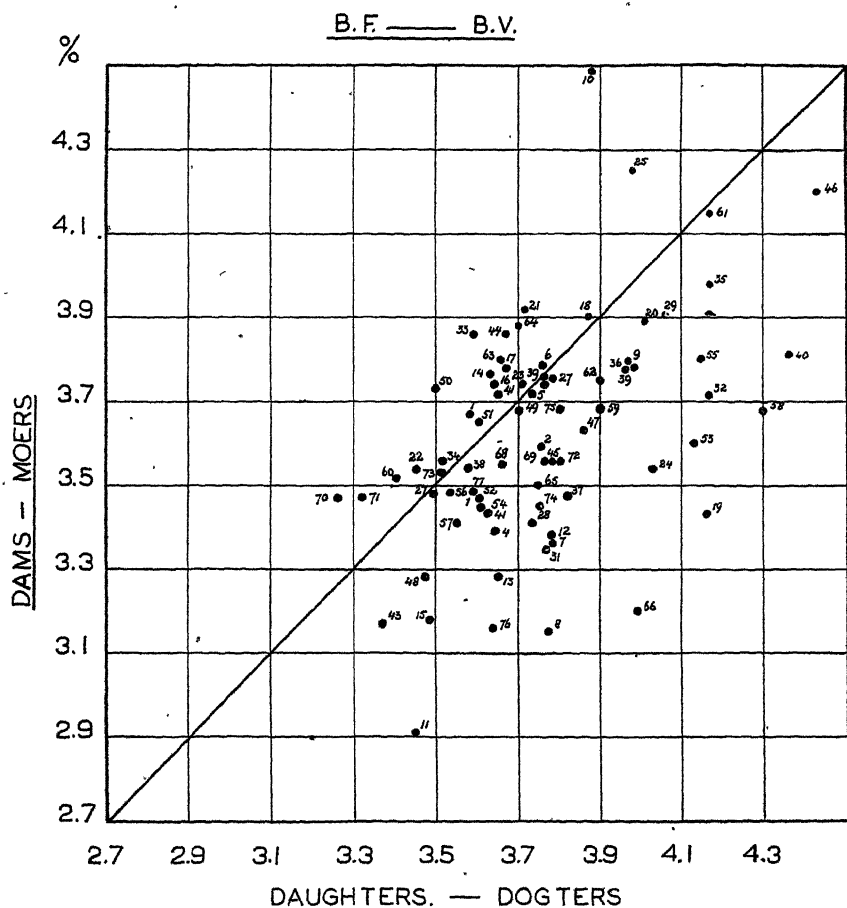


FIG. 1 (b).—Daughter-dam comparisons for butterfat percentage.

From the above table it will be seen that Bertus has a marked influence upon the quantitative and qualitative production of his daughters. His daughters showed a significant average increase of 1058.5 lb. of milk and 0.18 per cent. butterfat over that of their dams. Statistically, these differences were significant ($P < .01$).

The average two-year-old production of 9047 lb. milk and 3.78 per cent. butterfat for all available Bertus daughters must be considered as very satisfactory and of a very high standard. The improvement in production of the Bertus daughters is perhaps even more remarkable when it is taken into consideration that he was used mainly on the daughters of the two preferent bulls Lodewijk 13921 and Lodewijk 13434. The average production of the Bertus daughters out of the daughters of these two bulls is compared in the following Table:—

16 Bertus daughters.	16 Lodewijk 13921 daughters.
9225.2 lb. milk; 3.855% B.F.	8460.4 lb. milk; 3.73% B.F.
Difference: +764.8 lb. milk and + 0.10% B.F.	
31 Bertus daughters.	30 Lodewijk 13434 daughters.
9216.3 lb. milk; 3.72% B.F.	8002.7 lb. milk; 3.75% B.F.
Difference: +1193.6 lb. milk and + 0.03% B.F.	

It is evident that the Bertus daughters showed a marked increase in milk production, particularly in the case of his daughters out of Lodewijk 13434 daughters, whilst the relatively high level of butterfat percentages of the Lodewijk daughters was maintained.

The most remarkable improvement was shown in the 6 daughters out of Henriot 2965 daughters as is shown by the following averages.

<i>Bertus daughters</i> (6).	<i>Henriot daughters</i> (6).
8672.0 lb. milk; 4.077% B.F.	7.322 lb. milk; 3.248% B.F.

Difference: +135.0 lb. milk and +0.829% B.F.

The graphical presentation of the data reveals a somewhat greater variation in the milk production than in the percentage B.F. distribution of his daughters. The age-corrected milk yields of his daughters varied between 6,100 and 12,550 lb., whereas the percentage butterfat varied between 3.23 per cent. and 4.36 per cent. It is interesting to note that Bertus succeeded in improving the butterfat percentage in his daughters out of *all* cows testing below 3.45 per cent.

The results of the analyses of the breeding value of Bertus 8664 with regard to his transmitting qualities for both milk production and butterfat percentage prove that he was an outstanding bull, and bred well for both a high level of milk production and butterfat percentage.

Analysis of the Conformation of the Progeny of Bertus 8664.

The official sectional score card as employed by the Friesland Breeders Association for the inspection of pedigree Frieslands for admission to the studbook serves as a fairly accurate description of individual animals. The numerical values assigned to the various parts of the animal are obviously approximate. The allocation of points for any particular part of the animal is subject to slight variations due to personal differences of opinion and judgment between different judges. Nevertheless the score card is a very valuable measure for determining the standard of animals and directing the attention of breeders to desirable and undesirable features of the external anatomy of animals.

A compilation and analysis of the individual score cards of the progeny of a sire may reveal outstanding characteristics and defects in the general conformation of his progeny.

The available data of the progeny of Bertus 8664 included the individual score cards of 89 females and 74 males which are collectively presented in Figures 2 (a) and 2 (b).

From the data thus presented the following observations and conclusions may be drawn:—

(a) The average total score for all the male and female progeny was 75.96 and 76.19 respectively. This can be considered a high average standard of excellence.

(b) The outstanding characteristics of his progeny, as indicated by the points awarded in the different sub-sections of the score card, were that they were deep-bodied animals with well-shaped and well-developed necks and chests, well-attached shoulders and withers, and deep well-sprung ribs, and that they had good backs and strong top-lines. Both the male and female progeny had excellent scores for quality of skin and hair, milk indications, character and trueness to type. The thighs, buttocks, twist and tail were generally very good.

(c) The analysis reveals, however, a lack of uniformity with regard to the standard of excellence of the heads, this being more pronounced in his female progeny, which included a fair number of daughters with BC and BC- for heads. Another general weakness

in a fairly high percentage of his progeny was disclosed in the scores allocated for hocks, legs and hoofs.

Bull: BERTUS 8664/7

OFFICIAL SCORE OF.....										
	Head.	Neck, Chest, etc.	Grops, Ribs, etc.	Hips, etc.	Thighs, etc.	Hocks, etc.	Udder, etc.	Skin, Hair, etc.	Character and True-ness to Type.	General Appearance.
OFFICIAL SCORES OF FEMALE PROGENY.										
A										
AB							/		/	
AB—				/						
B+	/	III	IIII	/	IIII		II	II	IIII	/
B	IIII IIII IIII II	IIII IIII IIII II	IIII IIII IIII II	IIII	IIII IIII IIII II	IIII	IIII	IIII IIII IIII II	IIII IIII IIII II	IIII IIII IIII II
B—	IIII IIII IIII II	IIII IIII IIII II	IIII IIII IIII II	IIII IIII IIII II	/	IIII II	IIII II		IIII IIII IIII II	IIII IIII IIII II
BC+	IIII IIII IIII II	IIII IIII IIII II	IIII IIII IIII II	IIII IIII IIII II		IIII IIII IIII II	IIII IIII IIII II		IIII IIII IIII II	IIII IIII IIII II
BC.	IIII IIII IIII II	IIII IIII IIII II	IIII IIII IIII II	IIII IIII IIII II		IIII IIII IIII II	IIII IIII IIII II			IIII IIII IIII II
BC—	IIII IIII IIII II									
C+				/						
C										
CD										
TOTAL SCORES. 73.3, 76.0, 77.7, 76.6, 77.8, 75.9, 81.3, 77.2, 78.6, 78.2, 75.5, 75.9, 78.9, 76.6, 78.5, 77.1, 78.9, 74.0, 76.1, 76.3, 78.4, 80.4, 79.3, 72.9, 72.7, 79.8, 77.7, 76.8, 77.4, 80.3, 78.7, 80.3, 73.2, 76.6, 75.6, 75.1, 78.5, 76.2, 80.4, 75.6, 74.3, 75.1, 75.2, 74.9, 74.4, 73.7, 73.3, 79.0, 75.0, 77.2, 79.5, 74.2, 77.5, 80.4, 78.9, 74.5, 73.2, 74.0, 76.6, 73.3, 72.7, 75.9, 74.0, 75.2, 76.8, 75.2, 74.6, 72.9, 73.6, 75.0, 74.0, 75.0, 71.4, 73.8, 73.7, 77.1, 75.2, 73.2, 74.4, 73.9, 76.1, 75.9, 75.2, 76.1, 77.7, 78.4, 77.3, 76.9										

FIG. 2 (a).—Official scores of female progeny of Bertus.

THE BREEDING VALUE OF FRIESLAND BULLS IN SOUTH AFRICA.

BERTUS (continued).

Head and Horns.	Neck, Chest, etc.	Crops, Ribs, etc.	Hips, etc.	Thighs, etc.	Hocks, etc.	Milk Indication.	Character and True-ness to Type.	General Appearance.	
OFFICIAL SCORES OF MALE PROGENY.									
									A
	I			I					AB
							I		AB—
		III	I	II III		III	IIII	III	B+
IIII IIII	IIII IIII	IIII IIII	IIII IIII	IIII IIII	IIII IIII	IIII IIII	IIII IIII	IIII IIII	B
IIII IIII	IIII IIII	IIII IIII	IIII IIII	IIII IIII	IIII IIII	IIII IIII	IIII IIII	IIII IIII	B—
IIII IIII	IIII IIII	IIII IIII	IIII IIII	IIII IIII	IIII IIII	IIII IIII	IIII IIII	IIII IIII	BC+
IIII IIII	IIII IIII	IIII IIII	IIII IIII	IIII IIII	IIII IIII	IIII IIII	IIII IIII	IIII IIII	BC
			II						BC—
									C+
									C
									CD
SCORES 75.9, 74.2, 78.8, 73.4, 78.8, 77.4, 81.7, 80.4 76.5, 76.1, 75.3, 79.2, 75.7, 72.2, 80.4, 74.3, 73.1 78.6, 78.9, 77.4, 74.3, 80.2, 75.7, 78.5, 77.6, 74.3, 80.2 78.4, 79.6, 78.2, 74.7, 80.0, 80.3, 75.0, 73.4, 77.1, 74.5 77.0, 71.9, 74.0, 74.9, 73.1, 72.3, 76.7, 77.4, 74.6, 74.5, 77.7, 73.7, 74.2 74.0, 74.0, 72.0, 71.9, 75.5, 77.0, 75.1, 76.1, 73.7, 72.8, 73.7, 74.4, 75.7, 77.6 74.4, 73.2, 71.2, 71.3, 72.0, 77.3, 76.9, 79.3, 80.1, 75.5, 75.6									

FIG. 2 (b).—Official scores of male progeny of Bertus.

These observations are in close agreement with, and substantiate those published by the Preferent Commission of the " Friesse Rundvee Stamboek Vereeniging " in Friesland.

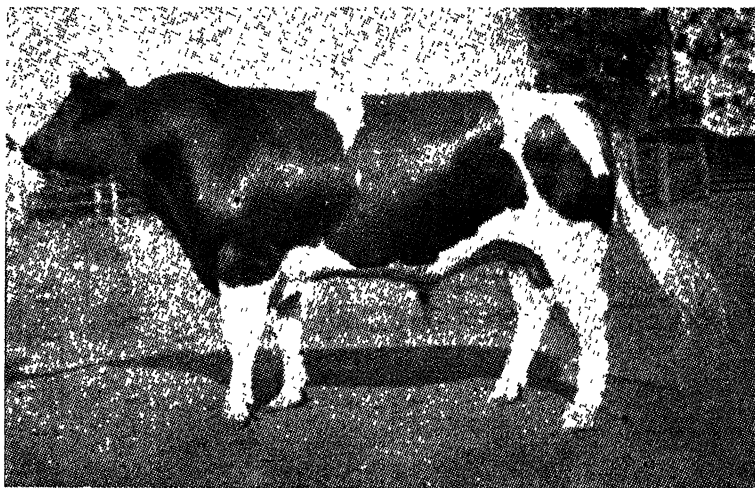
Conclusions.

The analysis of the breeding value of Bertus leaves little doubt that he was a prepotent and outstanding sire of preferent class. No imported bull is perhaps better known in South Africa or has had a greater influence upon the Friesland herds in this country than Bertus 8664. Many of his sons and grandsons, both imported and South African-bred, have been extensively used in several well-known pedigree herds in this country.

Amongst the best-known sons may be mentioned Bertus XI (Pref. B) bred in Holland, Melrose Staatsman 13294 (Pref. B), Brakfontein Rotus 13525 (Pref. B), Melrose Andela 12841, Melrose Span 12973, Brakfontein Bertus Paul 14168, Brakfontein Roland VI 13755, Brakfontein Bozum 13746, Brakfontein Bertus IV 13672, Brakfontein Roelf 13939, Brakfontein Melkbron 13677, and many others.

As a result of the very marked beneficial influence which Bertus, his sons and his grandsons have had upon the standard of excellence of the Friesland breed in South Africa, breeders have shown a tendency in recent years to over-concentrate on Bertus blood. In this connection it is perhaps necessary to sound a note of warning. However prepotent and well a sire may have bred, it is always dangerous to line-breed indiscriminately to such a famous bull. Inexperienced breeders often follow what has become a popular line of breeding as a result of the success obtained by more experienced breeders. The danger of this fallacy is becoming evident to intelligent and experienced observers of the breed in South Africa. In order to rectify some of the faults of the Bertus line which have been observed more frequently in the past few years, the introduction of a number of well-bred and less closely-related Friesland bulls from Holland would be of very great benefit to the Friesland breed in this country.

(2) Athleet 11950/8 (19048 F.R.S.)



Athleet, No. 19048, F.R.S.

THE BREEDING VALUE OF FRIESLAND BULLS IN SOUTH AFRICA.

Date of Birth: 4 February, 1930.

Died: 1937.

Breeder: J. A. Tullener, Lollum, Holland.

Owner: Baynesfield Estate, Nelsrust, Natal.

Score: 80 points in Holland

Athleet 11950/8 was imported by the late Mr. John Grant on behalf of Baynesfield Estate in June 1932.

Pedigree.

Athleet 15272, Pref. A.....	{ Anna's Roland, 13694.....	{ Roland XVIII, 10934.
		{ Kleiterp XI, 33910.
Boonstra VIII, 50711.....	{ Bertha Roland, 50746.....	{ Tiersma's Roland, 12260.
		{ Bertha, 29222.
	{ Gerard 9956.....	Gerard 6808, Pref. B.
		{ Boonstra VII; 38109.....
		{ Johannes Pel, 8025.
		{ Boonstra V, 32355.

Production Records.

Age.	Milk in lb.	B.F. %	Days.
50711—			
2.....	5,931.2	4.03	295
3.....	7,810.0	4.00	312
50746—			
2.....	6,692.4	3.86	317
4.....	11,475.2	3.58	326
5.....	11,022.0	3.59	302
6.....	12,078.0	3.82	326
7.....	7,530.6	3.82	270
8.....	9,495.2	3.57	292
38109—			
2.....	5,308.6	4.39	323

From the pedigree it will be seen that Athleet 19048 is also a son of the preferent sire Athleet 15272 and therefore a half brother of Bertus 8664. On the dam's side these two bulls also have a common ancestor in their great grandsire Gerard 6808. Athleet 19048 was extensively used in the Nelsrust herd. There are 49 male progeny of his registered in the Calf Book and 55 in the Herd Book; 78 female progeny are registered in the Calf Book and 35 in the Herd Book.

Analysis of Data.

From the available milk records it was possible to analyze 68 dam-daughter comparisons. These records were produced practically without exception in the herd at Nelsrust and are therefore comparable as far as environmental conditions are concerned. The climatic conditions at Baynesfield Estate are, however, not conducive to optimum production in Friesland cows. The maximum summer temperatures frequently exceed 90°F. during the period October to February. Such high external temperatures have a depressing influence upon the total milk yield. In the natural vegetation of the area, sourveld predominates and the veld is of poor nutritive value for the greater part of the year. Rainfall conditions, however, allow for the establishment of artificial pastures and the cultivation of succulent fodder crops.

A comparison between the average calculated 2-year-old production of milk and butterfat of the Athleet daughters and of their dams is given in the following Table.

Milk Yield and Butterfat Percentage.

Daughters (68).	Dams (68).	Average increase or decrease in production of daughters.	Percentage of daughters which show an improve- ment on dams.	STATISTICAL SIGNIFICANCE.	
				P = .05.	P = .01.
7260.0 lb.	7854.0 lb.	MILK —594 lb.	YIELD. 30%	Sig.	Sig.
3.88%	2.50%	BUTTERFAT PERC +0.38%	ENTAGES. 91%	Sig.	Sig.

The details of the individual daughter-dam comparisons for milk yield and butterfat percentage are shown graphically in Figures 3 (a) and 3 (b).

From the data presented it will be seen that the daughters of Athleet could not maintain the same level of milk production as their dams. The average decrease was 594 lb. of milk. The difference was statistically significant ($< .01$). From the graphical

• MELK-MILK.

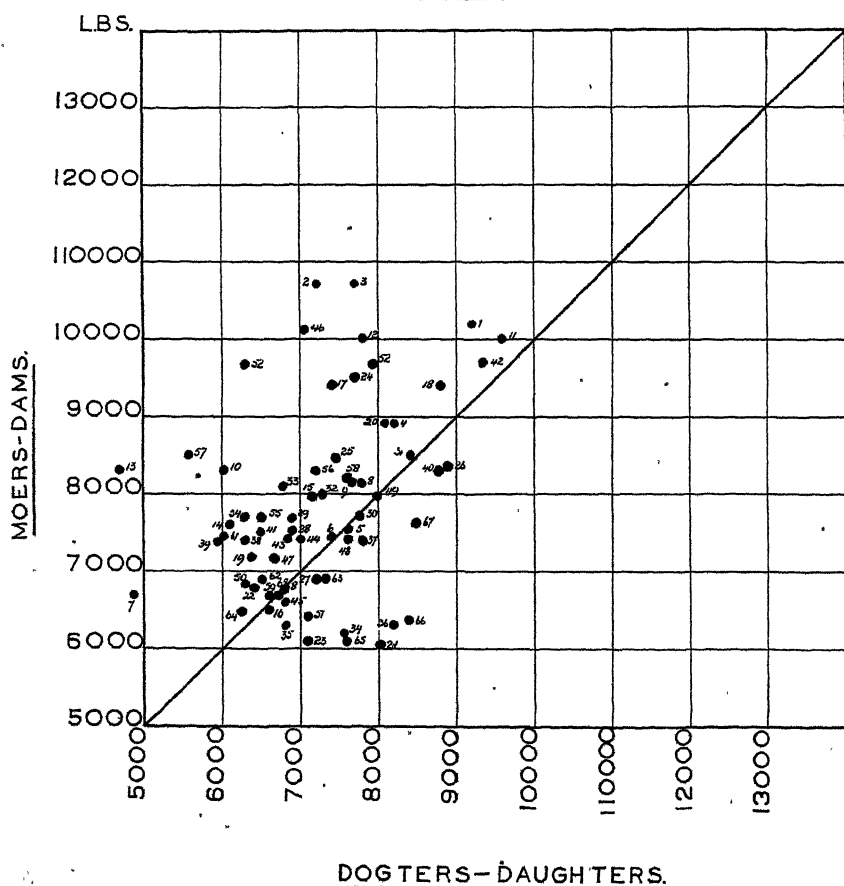


FIG. 3 (a).—Daughter-dam comparisons for milk yield on 2-year-old basis.

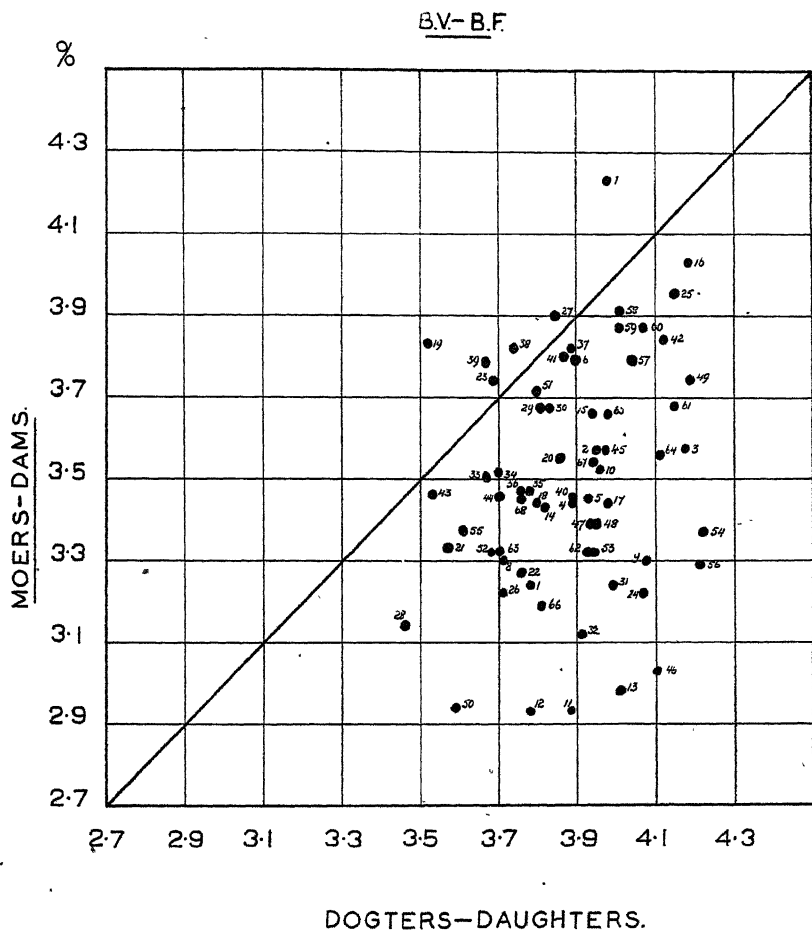


FIG. 3 (b).—Daughter-dam comparisons for butterfat percentage..

presentation of the data it will be noted that the distribution of the milk yield of Athleet's daughters was remarkably consistent between the levels of 6,000 and 8,000 lb. It is difficult to ascertain to what extent nutritional and environmental conditions account for the comparatively disappointing level of milk production. The production records of both daughters and dams were made at Nelsrust. It can be concluded, therefore, that Athleet was not capable of breeding daughters of the same average level of production as that of the cows to which he was mated.

On the other hand, his daughters showed a very marked improvement in the percentage butterfat. The notable average increase of .38 per cent. is statistically significant ($P < .01$). It must further be mentioned that 91 per cent., i.e. 62 out of his 68 daughters showed an improvement in their butterfat percentage as compared with that of their dams. The graphical distribution of the butterfat percentages of his daughters further substantiates the conclusion that Athleet was prepotent and bred exceptionally consistently for high butterfat.

Athleet followed the two imported bulls Jonge Pel Rooske 5631/6 and Emma's Lodewijk 7890/7 in the Nelsrust herd and was used mainly on daughters of these two bulls.

Bull: ATHLEET 11950/8

OFFICIAL SCORE OF.....										
	Head.	Neck, Chest, etc.	Crops, Ribs, etc.	Hips, etc.	Thighs, etc.	Hocks, etc.	Udder, etc.	Skin, Hair, etc.	Character and True- ness to Type.	General Appear- ance.
OFFICIAL SCORES OF FEMALE PROGENY.										
A										
AB										
AB—										
B+										
B	I	II	III		III III III II		III	III III III III III	II	I
B—	II	I		II	III III I	I			I	I
BC+	II	III	III III II	III	II	II	III		III II	III II
BC	III III III III III	III III III III I	III III III III II	III III III III II		III III III III III I	III III III III III	I	III III III III II	III III III
BC—	III	I					II		I	III I
C+	I						II		I	
C										
CD	I									
TOTAL SCORES. 71.5, 73.6, 74.2, 71.4, 71.3, 70.8, 70.3, 73.0, 73.2, 70.2, 78.5, 70.5, 72.6, 73.4, 72.5, 70.0, 72.6, 75.7, 70.1, 71.2, 71.7, 70.9, 70.3, 70.5, 70.0, 71.4, 70.0, 70.3, 71.9.										

FIG. 4 (a).—Official scores of female progeny of Athleet.

THE BREEDING VALUE OF FRIESLAND BULLS IN SOUTH AFRICA.

ATHLEET (continued).

Head and Horns.	Neck, Chest, etc.	Crops, Ribs, etc.	Hips, etc.	Thighs, etc.	Hocks, etc.	Milk Indication	Character and True-ness to Type.	General Appearance.	
OFFICIAL SCORES OF MALE PROGENY.									
									A
									AB
									AB-
				III			I		B+
III	III	III	II	III	I	III	III	III	B
III	III	III		III	III	III	III	III	B-
III	III	III	III	III	III	III	III	III	BC+
III	III	III	III	III	III	III	III	III	BC
I		I	II		III			III	BC-
									C+
									C
									CD
SCORES. 72.9, 79.4, 74.3, 74.0, 75.4, 73.7, 73.4, 72.9, 74.5, 73.2, 76.5, 77.3, 74.6, 74.3, 74.0, 72.6, 72.3, 71.0, 72.3, 75.5, 75.9, 70.9, 70.7, 71.2, 73.5, 72.9, 70.4, 71.8, 77.4, 75.5, 71.6, 72.3, 76.2, 70.4, 74.0, 72.3, 74.0, 75.0, 79.7, 73.5, 75.0, 73.8, 73.3, 72.6, 73.6, 74.9, 74.4, 73.3, 73.2, 71.6, 74.6, 72.6, 72.6, 72.9, 74.3, 73.8.									

FIG. 4 (b).—Official scores of male progeny of Athleet.

Jonge Pel Rooske was a son of the preferent bull Pel Rooske 11786 out of the Albert 1306H—Jan 3540 line and out of the Zeppelin 5114 line on the dam's side. Emma's Lodewijk was a son of the preferent bull Lodewijk 13931 and his dam was out of the Albert 1306H—Jan 3540, Ceres 4497 line.

Athleet 19048, on the other hand, was a line-bred descendant of the Jan 3265—Nico 4969—Gerard 6808 line. It is therefore interesting to compare the Athleet daughters out of the daughters of Jonge Pel Rooske and Emma's Lodewijk, respectively. There were sixteen dam-daughter comparisons of Athleet daughters out of Jonge Pel Rooske daughters, and 24 comparisons out of Emma's Lodewijk daughters. The influence effected on both milk production and butterfat are shown in the following table.

Athleet daughters (16).

*Jonge Pel Rooske
daughters (16).*

7380.0 lb. milk; 3.86% B.F. 7766.0 lb. milk; 3.39% B.F.

Difference: -386 lb. milk and +0.47% B.F.

Athleet daughters (24).

*Emma's Lodewijk
daughters (24)*

7010.4 lb. milk; 3.90% B.F. 7520.0 lb. milk; 3.72% B.F.

Difference: -509.6 lb. milk and +0.18% B.F.

It is interesting to note that in both cases Athleet failed to improve milk production, but was responsible for a very marked increase in the percentage butterfat.

Analysis of the Conformation of the Progeny of Athleet.

The analysis of the score cards of 56 male and 29 female progeny of Athleet is shown in Figures 4 (a) and 4 (b).

From the data presented it will be seen that the average scores of the male and female progeny was 73.82 and 71.96, respectively. For a bull with the breeding and conformation of Athleet (who himself scored 80 points) mated to the daughters of two well-bred imported bulls like Jonge Pel Rooske and Emma's Lodewijk (81 points), the average scores of his progeny are very disappointing.

The analysis of the score cards does not reveal any outstanding merits or defects in the conformation of his progeny. The great majority of his progeny scored BC + and BC for all the more important subsections of the score card. To what extent environmental and nutritional conditions prevented the optimum development of his progeny, is difficult to ascertain. The analyses from the point of view of both production and conformation seem, however, to suggest that unfavourable conditions due to environment, nutrition and management have to some extent been responsible for certain of the disappointing features of the progeny test of Athleet 19048.

REFERENCES.

- BONSMAN, F. N. (1943). Department of Agriculture and Forestry, Union of S.A., Bull. 242.
EDWARDS, J. AND HUNTER SMITH (?). Importance of Progeny Test in Dairy Breeding, p. 2.
EDWARDS, J. (1932). *Journ. Dairy Science*, 22, 4, pp. 811-837.
GROENEVELD, B. J. B. (1939). Overdruk uit *Jaarboek 1939 van den Alg. Bond van Oud Leerlingen van Inr. voor Middelbaar Landbouw-onderwijs*.
GOWEN, J. W. (1924). *Milk Secretions*, Williams and Wilkins Book Comp.
LUSH, J. L. (1931). *Journ. Dairy Science*, 14, pp. 209-220.
LUSH, J. L. (1933). *Journ. Dairy Science*, 16, pp. 501-522.
SANDERS, H. G. (1929). *Journ. Agric. Sc.*, 17, pp. 330-379-502-523.
TURNER, C. W., RAGSDALE, A. C., AND BRODY, S. (1923). *Journ. Dairy Sc.*, 6, pp. 527-531.

Phenothiazine: A Remedy for Internal Parasites.

Dr. R. J. Oortlepp, Division of Veterinary Services, Onderstepoort.

ALTHOUGH the drug phenothiazine has for several years been used in America, Canada, Australia, England and elsewhere for the control of internal parasites in domestic animals, it has only recently become available in South Africa, and this Division has had to answer a considerable number of questions concerning its efficacy and method of application.

Although the Division has not yet carried out extensive tests with the drug, much information has been obtained from overseas and it may be confidently stated here that the remedy is very effective, and in many cases much more so than the remedies which have up to the present been used for the control of worms. Unfortunately the drug is expensive and also very bulky; consequently its application is difficult, especially in the case of sheep.

Abroad the remedy is available in two forms, viz., in powder and in tablet form. Tablets are easier and cleaner to use, but more expensive than the powder. In South Africa it is as yet available only in powder form. The pure drug is insoluble in and does not mix with water and therefore a wetting agent must be added to the powder, which can then be mixed to a thin paste with water before being administered. If no wetting agent is available, a paste may be made if the mixing water contains 1 per cent. yellow soap in solution.

The doses, method of application and efficacy of the drug for various animals, are discussed below.

Sheep and Goats.

For these animals the dose is 20 to 25 grams* for a full-grown animal and 10 to 15 grams for lambs 4 to 9 months old; the smaller dose is effective for worms in the milk stomach (abomasum) if given after a small dose of 10 per cent. copper sulphate solution (1 lb. to a gallon or 2 ounces to a pint of water). The larger doses must be used for worms in the intestines; here too it is desirable to give the drug after a dose of copper sulphate solution, although this is not essential.

To prepare the paste, 4 lb. of the powder is rubbed through a fine sieve to remove any lumps, and then stirred into 5 pints of clean, cold water to form a thin paste. From 1 to 1½ ounces of this paste for lambs and 2 ounces for full-grown sheep will be approximately the correct doses. After the paste has been mixed, it should be stirred occasionally, for the powder is inclined to settle. The above-mentioned quantity is sufficient for dosing about 80 full-grown sheep or from 120 to 160 lambs once, and its cost will be approximately 25s. The remedy can be administered with a 2-ounce dosing syringe with a leather washer (not metal), or with a 2-ounce medicine bottle or a funnel provided with a rubber tube 6 inches long, to which must be attached a metal tube 4 inches long. If the tube is too narrow, the paste will block it and will have to be diluted with a little water. In this case the dose must be increased accordingly.

The remedy is practically 100 per cent. effective for the control of all round worms occurring in the abomasum, viz., wireworms, brown stomach worms and bankrupt worms, as well as hookworms, large-mouthed worms and nodular worms in the intestines; it is

* N.B.—One ounce by weight is equal to approximately 30 grams and one ounce of liquid approximately 30 c.c.

considerably less effective in the treatment of bankrupt worms in the small intestine, although still a good remedy against these parasites. It is not effective against long-necked worms, flukes or tapeworms.

Small stock can be treated at any time, and it is not necessary to keep them away from feed or water before or after treatment. Animals in very poor condition or those suffering from anaemia must receive only half the full dose. If the farmer is using the remedy for the first time, it is advisable to test it out on about 10 animals of varying age and condition. If the effect is injurious, the dose must be reduced. Ewes expected to lamb within a month should not be dosed.

Since the remedy is expensive and not easy to administer, farmers will in practice be able to dose animals only once or very few times a year; if only one annual treatment is applied, it should take place just before the winter, to enable the sheep to survive the winter in a comparatively worm-free condition. If more treatments are desired, they should be given in September-October and in January-February.

This remedy is no preventive; it will destroy the worms in the animals, but will not prevent reinfestation if the animals graze on infested veld. It is advisable therefore to treat the animals with Tetram and Nodular Worm Remedy every three weeks after the administration—once with Tetram and two or three times with Nodular Worm Remedy. If the animals receive salt and a bone-meal lick, one part of phenothiazine may be mixed with nine parts of the lick. The amount of the drug which each animal ingests with the lick is sufficient to counteract the development and hatching of worm eggs in the manure, but insufficient to destroy the worms in the animals.

This practice will also help to reduce infestation of the veld.

Cattle.

The dose for full-grown cattle is 30 to 40 grams and for calves 15 to 20 grams; which means that a full-grown animal will receive 3 to 4 ounces and a calf 1½ to 2 ounces of the paste as prepared for sheep and goats. Before administering the remedy, cattle should be given half a cup of a 10 per cent. solution of table salt. The efficacy of the drug is as explained under the heading "Sheep and Goats", and the same rules apply to cattle.

Horses.

The remedy is very effective against most parasites of horses, such as small roundworms (*Trichonema* species) and red roundworms (*Strongylus* species) and, to a certain extent, the large roundworm (*Ascaris*), bankrupt worms and pinworms. The dose is 25 grams for a full-grown horse, 15 grams for yearlings and 10 grams for a foal 9 months old—younger foals should not be treated with the drug. The best and most effective method is to divide each dose into five equal portions and to give the horse one portion, mixed with a little bran every morning for five consecutive days.

Pigs.

In pigs the drug is very effective against nodular worms and the roundworm (*Ascaris*). The required dose for each pig is mixed with the animal's feed, the pigs being fed separately to ensure that each receives the correct quantity. The doses are as follows:—

- 5 grams for piglets weighing 25 lb.
- 8 grams for piglets weighing 25 to 50 lb.
- 12 grams for pigs weighing 50 to 100 lb.
- 20 grams for pigs weighing 100 to 200 lb.
- 30 grams for pigs weighing over 200 lb.

The South African Butter Industry.

The Expansion of the Industry Between 1911 and 1945.

Dr. C. W. Abbott, Professional Officer, Agricultural Research Institute.

THE expansion of an undertaking may be measured in various ways, namely, by studying the number of producing units, the number of employees, the value of the product or the amount produced. In this article the amount of butter produced each year is used to measure the expansion which has occurred in the industry.

In a young country relatively steady expansion is expected, but this is influenced by various external factors such as drought, economic conditions, governmental policy or legislative action.

For the purpose of this article the figures showing the annual production of creamery butter were gathered and analyzed.

TABLE I.—*Annual Production of Creamery Butter.*
(Comparison of data from various sources.)

Year ending in—	SOURCE OF DATA.			
	Annual Industrial Census. (1,000 lb.)	Division of Dairying Annual Report. (1,000 lb.)	Dairy Industry Control Board. (1,000 lb.)	Monthly Census of Foodstuffs. (1,000 lb.)
1926.....	13,470	13,632	—	13,176
1927.....	14,132	13,822	—	13,879
1928.....	14,156	14,209	—	14,005
1929.....	15,000	15,452	—	19,349
1930.....	18,180	19,922	—	18,377
1931.....	20,717	20,950	—	20,964
1932.....	21,399	18,038	21,764	22,167
1933.....	18,595	20,476	19,622	17,619
1934.....	18,658	18,658	18,496	21,117
1935.....	26,526	26,444	27,407	28,112
1936.....	32,224	32,135	32,095	32,945
1937.....	30,058	31,800	31,484	28,350
1938.....	31,159	±30,000	30,318	33,460
1939.....	37,695	36,460	36,393	40,359
1940.....	43,704	44,472	44,810	44,586
1941.....	42,539	45,366	44,955	41,001
1942.....	41,852	39,701	40,440	44,609
1943.....	42,989	±42,500	42,291	44,769
1944.....	—	±44,000	42,733	38,598
1945.....	—	±39,000	39,020	—
Total 1926-1943	483,053	484,037	—	498,844
Percentage difference.....	—	+0.105%	—	+3.167%
Total 1932-1943	387,398	386,050	390,075	399,094
Percentage difference.....	—	-0.348%	+0.691%	+3.019%
Period covered by each year.	Each creamery's financial year.	September to August.	October to September.	Calendar year.

The Data.

As far as is known, there is no publication in which a complete set of figures for annual production is shown. Data had therefore to be gathered from 4 different sources⁽¹⁾.

When the four sets of figures for any one year are compared, marked discrepancies are found. This is due in great part to the fact that each set relates to a different 12-month period as shown in Table I. These differences should, however, cancel out when production over a number of years is totalled.

The Annual Census was arbitrarily adopted as standard, and the other results compared with it on a percentage basis as shown in the lower part of the table. The figures of the Division of Dairying and those of the Dairy Industry Control Board agree reasonably well with the Annual Census, and even the Monthly Census does not show a very great percentage difference. It is difficult to explain why the latter should give consistently high results.

These differences make it hard to decide which figures to accept as representing the actual production. One solution is to assume

TABLE II.—*Annual Production of Creamery Butter in the Union of South Africa.*

Data from 1911 to 1943 from Annual Industrial Census, for 1944 and 1945 from Dairy Industry Control Board.

Year.	Actual production. (1,000 lb.)	5-year moving average. (1,000 lb.)	10-year moving average. (1,000 lb.)
1911.....	5,191	—	—
1912.....	6,254	—	—
1913.....	7,660	6,799	—
1914.....	6,567	7,366	—
1915.....	8,323	8,365	8,988
1916.....	7,877	9,235	9,621
1917.....	11,397	10,669	10,246
1918.....	12,014	11,177	10,666
1919.....	13,733	11,905	11,120
1920.....	10,864	12,125	11,365
1921.....	11,517	12,097	11,924
1922.....	12,508	11,571	12,197
1923.....	11,864	11,552	12,412
1924.....	11,104	11,942	12,538
1925.....	10,767	12,267	13,270
1926.....	13,470	12,726	14,190
1927.....	14,132	13,505	15,079
1928.....	14,156	14,987	15,752
1929.....	15,000	16,437	16,507
1930.....	18,180	17,890	18,083
1931.....	20,717	18,778	19,959
1932.....	21,399	19,510	21,551
1933.....	18,595	21,179	23,252
1934.....	18,658	23,480	25,521
1935.....	26,526	25,212	28,074
1936.....	32,224	27,725	30,256
1937.....	30,058	31,532	32,301
1938.....	31,159	34,968	34,740
1939.....	37,695	37,031	37,148
1940.....	43,704	39,390	38,397
1941.....	42,539	41,756	—
1942.....	41,852	42,763	—
1943.....	42,989	41,827	—
1944.....	42,733	—	—
1945.....	39,020	—	—

that production lay within the limits of the highest and lowest values, but for the further analyses of the data which were made, some fixed value was essential. Accordingly, the figures obtained for the Industrial Census were used from 1911 to 1943 (the latest available). These figures agree very closely with both the figures of the Division of Dairying and those of the Control Board. Also, they are those published in the Union Year Book and, by adopting them as far as possible, confusion is avoided, as the Year Book is the main source of statistical information. For 1944 and 1945, the Board's figures were selected as they are exact values, while the figures of the Division of Dairying are estimates to the nearest million pounds. The complete set of data showing annual production from 1911 to 1945 is set out in Table II, and from this data 5-year and 10-year moving averages were computed. The results are shown graphically in Figures I and II.

Discussion of Data.

The level of production of creamery butter is influenced by many factors. Some, such as a good season and low price of supplementary feed, work together to increase it. Others, such as a poor season which depresses it, and a high price for butter fat which tends to increase production, act in opposite directions.

It is of interest to try and determine what factors have been responsible for the fluctuations recorded in Figure I.

Numerous creameries were established between 1904 and 1914, and these encouraged butterfat production by providing a market for cream in areas where there had previously been no outlet. As a result of the Great War, further rapid expansion occurred. These two factors are responsible for the steady increase from 1911 to 1919.

Minor fluctuations such as those between 1913 and 1914; 1915 and 1916, 1927 and 1928, 1943 and 1944, probably represent the very slight differences between two "normal" seasons.

Economic conditions were mainly responsible for the unsatisfactory rate of expansion between 1920 and 1925. As a result of the "slump" after the war, butterfat prices were extremely low, and the creameries did not enjoy the confidence of the farmers.

By 1925 the effects of the export policy began to be felt and from then on there was a relatively rapid increase in production. The Butter Stabilisation Association (1928), the Dairy Industry Control Board (1930), the Dairy Produce Selling Agency (1934), the Dairy Products Marketing Scheme (1940) and the South African Creameries Association (1941), all contributed in varying degrees towards the stabilizing of the industry and towards its steady expansion.

The severe setbacks the industry suffered in 1933-34, 1937 and 1945, clearly show the effect of a dry season on the level of production, as these were years of severe and widespread drought. It would seem that the cream supply is largely dependent on the quality of the natural grazing as, for economic and other reasons, supplementary feeding to maintain the level of butterfat production is not generally practised during periods of drought.

It is of interest to compare the trend of production during the two war periods: 1914 to 1919 and 1939 to 1945. During the first period production rose steadily, but decreased during the second. The high cost of feed in relation to the price of butterfat has largely been responsible. As Tomlinson states: "Since maize is the most important feed item in dairy production, it can be deduced that the

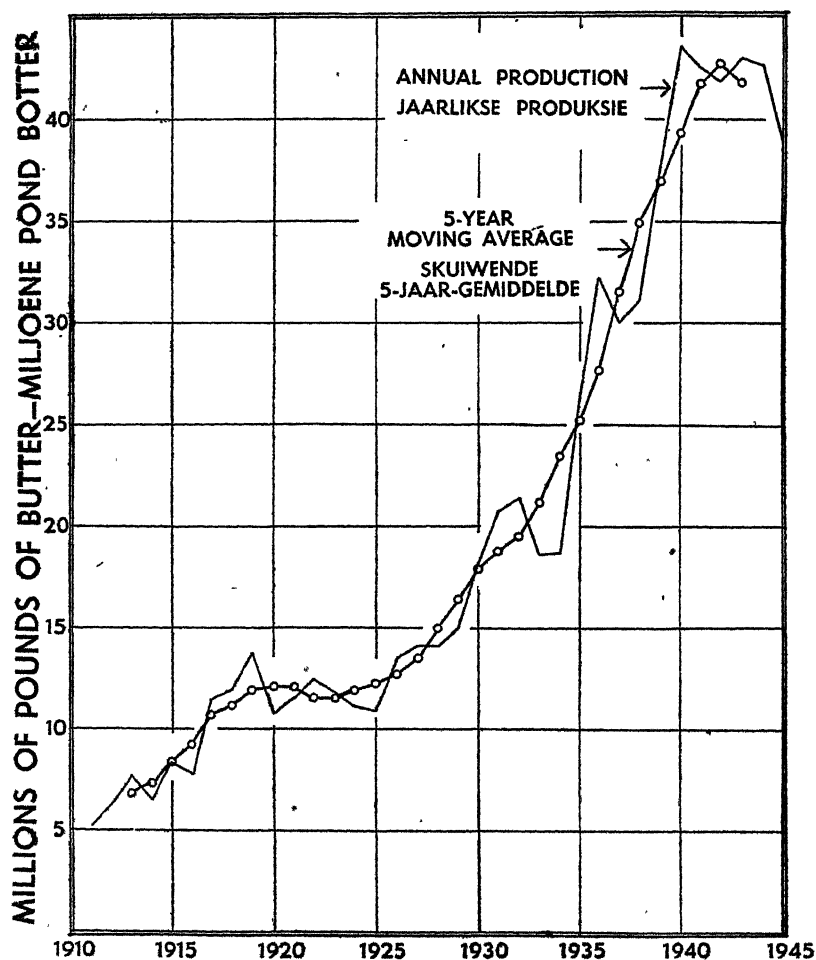


FIG. 1. The annual production of creamery butter in the Union of South Africa from 1911 to 1945 and the 5-year moving average.

price-cost relationship became less favourable in the case of dairy producers during the war period. The price-cost relationship is one of the most important factors in either expansion or curtailment of production. Last year's price-cost relationship might possibly have a curtailing effect on dairy production."⁽²⁾

The graph shows that the high cost of maize and the severe drought have exerted a very marked effect on production.

The two sets of moving averages enable one to ignore annual fluctuations and study long-period trends. By means of the 5-year moving average, production during various periods such as the 1914-1919 War and the subsequent slump can be studied, while the 10-year moving average indicates the general trend of the industry over the whole period.

The 5-year moving average shows a rapid increase from 1913 to 1919. From 1919 to 1925 the level was practically stationary, but after this production increased very steadily until 1941. The retarding effects of the 1933-34 and 1937-38 droughts were less marked than one would expect. From 1941, the effects of the war began to be felt and production increased less rapidly and finally showed an actual decrease.

Future Development.

When the future of the industry is being discussed, the question often arises as to whether South Africa has reached the limit of butterfat production. The moving averages will furnish the answer, as, when the limit has been reached, they will show upward and downward swings about a relative constant level in response to economic and other stimuli.

If butter production had been studied in 1926, it might then have appeared that the limit had been reached, as production fluctuated about the same level for 6 years. Fortunately this was not the case, as is shown by the fourfold increase which has occurred since then.

To-day the annual production shows a similar downward tendency and there is still the inevitable post-war depression ahead. Does this mean that the maximum production is about 40 million pounds? Fortunately the 10-year moving average shows that this is not the case, for the graph shows a strong and steady upward trend. It appears to have a slight sigmoid tendency, but this is due to the slow expansion of the industry up to about 1928 and to

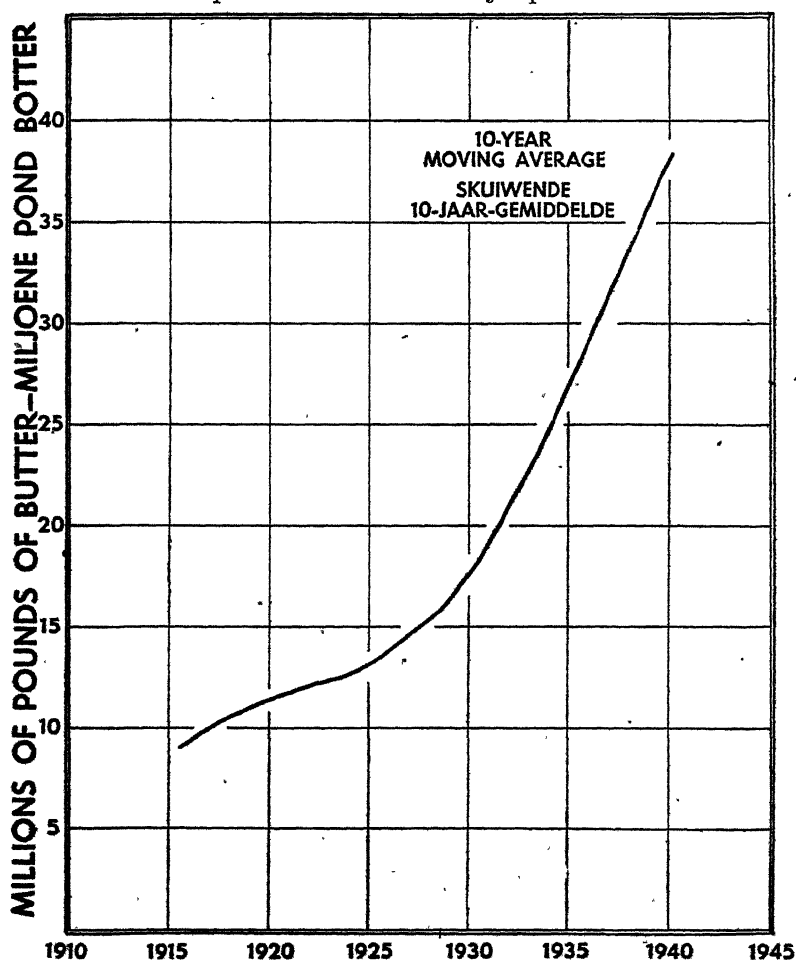


FIG. 2. The trend of creamery butter production in the Union of South Africa between 1911 and 1945.

the adverse conditions which prevented expansion during the period between 1939 and 1945. (Fig. II.)

Factors which will contribute to the continued expansion of the industry in the future are:—

(1) *Decrease in price of cattle feed.*—The importance of the price-cost relationship has already been mentioned. Therefore an increase in production depends on one of two things, namely, an increase in the price of butterfat in relation to the present high cost of feed, or, alternatively, a reduction in the cost of feed to a level which would make feeding profitable at the present or even at lower prices for butterfat. The first would fail in its purpose, however, as it would raise the cost of butter beyond the means of the consumer, and would merely accelerate inflation. On the other hand, when feed is "cheap" in relation to butterfat, then it pays the farmer to market his maize and other feeding stuffs as milk and cream.

(2) *Return to stability of the labour market.*—The war has greatly disturbed the labour market by causing an abnormal demand for skilled and unskilled labour. The vast demands of industry and the armed forces led to high wages and favourable conditions of employment. This reduced the supply of labour available to agriculture in general, and dairy farmers, among others, suffered.

With the closing of many war industries and gradual demobilization, more labour will be available and will gradually reach the farms. Producers will have to realize that farm wages will probably be higher than before the war. This will mean the employment of fewer labourers who will have to operate more efficiently if the farmer is still to show a profit.

(3) *Cancellation of army milk contracts.*—It is well known that the *per capita* consumption of dairy produce is higher in the army than among equivalent groups of civilians. The reduction in numbers of the army should release considerable quantities of dairy produce. In the towns much of the milk will reach, and be absorbed in, the ordinary retail market, but in rural areas the milk that was supplied to army camps near by, or railed to large towns to relieve the shortage there, will become surplus and will be separated. This will in turn increase the production of butter.

(4) *Return to butterfat production.*—Many farmers who formerly produced large quantities of butterfat have abandoned this enterprise or else produce only very small quantities. Some of the factors which led to this were the high cost of feed and labour difficulties which discouraged production. The high prices offered for land led many farmers to sell out, and others disposed of their herds or reduced them to be able to sell crops which offered a higher cash return. When crop prices fall, labour is plentiful and land becomes normal in price, then butterfat production will come into its own again. Of all the farm products, milk and cream are the only ones which bring in a regular cash income month by month. The harvest may cover the big items of expenditure, but the cream cheque pays the wages and the day-by-day cash expenses. As farmers find their income from other sources decreasing, one may expect an increase in butterfat production.

(5) *Rebuilding of butterfat herds.*—The great demand for milk cows near the cities was an important factor in reducing the size of the "butterfat" herds in rural areas. The peri-urban milk producers operate on an intensive system and seldom breed their milk cows. Instead, they buy heifers in calf or young cows from the rural areas. The calves are usually slaughtered and the cows kept until they are "milked out", when they too are disposed of.

These cows and their progeny are thus a dead loss as breeders. In normal times it is only the "surplus" cows which reach the market, and the "butterfat" herds in the rural areas are maintained at full strength, and so serve as a source of supply. The abnormally high prices offered for milk cows by peri-urban milk producers have disturbed the balance, and instead of only the surplus being sold, whole herds have been sold and others greatly reduced. This means that the "breeding stock" which supplied the bulk of the commercial (not pedigreed) stock has been reduced to a level where it cannot produce enough calves to replace wastage. It will be some time before the depleted rural herds are built up and butterfat production reaches normal levels again.

(6) *Increased knowledge of basic facts of sound agricultural practice.*—As the principles of "balanced farming" are preached to farmers, more and more of them will come to realize that the animal plays an essential part in maintaining soil fertility. When the proper balance is reached, a greater production per unit area will be obtained and so butterfat production will expand.

The irrigation settlements could contribute a greater proportion of butterfat than they do at present, but this can only occur when the holdings are operated on an intensive basis as balanced agricultural units, and when full use is made of high-producing cows to maintain soil fertility and dispose of crops profitably.

(7) *Efficient feeding and management of stock.*—Even though a farmer follows a general system of balanced farming, the details within that system may nevertheless be incorrect and so reduce his profits. Low production per cow is the greatest single factor retarding the expansion of the butter industry to-day. As butter absorbs the greatest amount of milk produced in the country, any over-all increase in milk production will benefit the butter industry. A recent survey showed that about 1,800 high-grade cows supplying milk to Pretoria produced only an average of 1.1 gallons a day over a year⁽³⁾. These were cows in commercial dairy herds supplying fluid milk from high-priced land. No accurate determination of the average milk production per cow has ever been made for South Africa as a whole. There are numerous indications, however, that, over a whole year, production does not greatly exceed 4 (four) pints per cow per day! If by proper feeding and management the average production could be increased to only 6 pints per day, then butter production should increase by 50 per cent. to 60 million pounds per annum.

From the foregoing discussion it is evident that the industry as such can do little to bring about its own expansion. All parts of the country are within reasonable distance of a creamery, so there is no chance for the industry to tap new areas of production. On the other hand, farmers can do a great deal to expand the butter industry, for they are the producers of the raw material—butterfat. This calls for a modification of farming systems aimed at greater production per cow, which will entail provision of supplementary feed as well as better selection and care of cattle.

The Department of Agriculture, through its Education and Extension Services, can do much to assist in this.

If the farmer can obtain a greater return per cow, he can accept a lower unit price for his butterfat, and yet operate profitably. The greater production of butter per creamery will lower manufacturing costs so that the price of butter can be reduced. This will open a wide market for it and help to protect the farmer and the industry from the ever-present threat of butter-substitutes.

The future expansion of the butter industry is thus partly dependent on a return to normal conditions in agriculture, but to a greater extent even on the adoption of more efficient farming systems in areas suited to butterfat production.

Summary and Conclusion.

Data showing the annual production of creamery butter in the Union of South Africa from 1911 to 1945 were gathered from various sources. Although there appear to be marked discrepancies between data from different sources, these are mainly due to the different 12-month periods to which the data apply. When the differences are expressed as a percentage of the total production over a long period, they are found to be surprisingly small.

The data show that drought is by far the greatest single factor causing short-term fluctuations in production.

The 5-year moving average indicates that economic factors such as low prices for butterfat or high cost of feed exert a less marked effect than droughts, but persist for a longer period.

The 10-year moving average indicates the steady and vigorous expansion of the industry, during which it has overcome many different setbacks and obstacles.

It is concluded that the industry is still capable of enormous expansion, but this is dependent on:

(1) Lowering the price of feeds to a level where feeding becomes more profitable,

(2) the return to stability of the labour market, so that farm labour will be available at rates which are in relation to the price of butterfat,

(3) the cancellation of army milk contracts which will release milk for separating and increase the amount of butterfat available,

(4) the return to butterfat production will occur when the prices of cash crops decrease and a steady income is required,

(5) the rebuilding of the butterfat herds which have been depleted by the demand for milk cows near large towns,

(6) the application of sound systems of balanced agriculture, so that the cow becomes an essential part of the farm economy, and

(7) better feeding and management of dairy cattle, which will have the greatest influence on the future expansion of the industry.

It is stressed that buttermaking is a secondary industry and that its continued expansion depends on an increased output of butterfat by farmers.

REFERENCES.

(1) The four sources of figures showing annual production of butter are:—

(a) *The Annual Industrial Census* of the Office of Census and Statistics, Pretoria. The figures are based on the total production during each creamery's financial year. These are the figures published in the Union Year Books.

(b) *The Monthly Census of Foodstuffs*, conducted by the same office. The total production for each month is published in the press releases of the Office of Census and Statistics and the annual totals refer to calendar years.

(c) *Monthly Returns to the Dairy Division*, made by each creamery and showing the quantity of butterfat purchased and butter made. The total production for the year ending 31 August, is published in the Annual Report of the Superintendent of Dairying.

(d) *Returns to the Dairy Industry Control Board*, made weekly and monthly. The Board publishes press releases showing weekly production, but the totals for the year ending 30 September are published at irregular intervals.

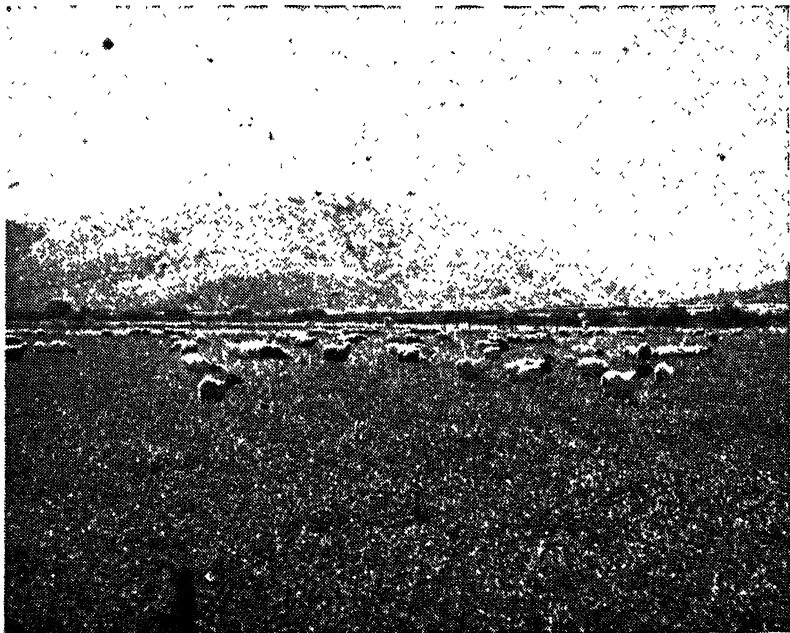
(2) TOMLINSON, F. R.—Price Trends and Price Relationships. *Farming in South Africa*, Vol. XIX, No. 229. April, 1945.

(3) BAKALOR, S.—Agricultural Research Institute, Pretoria. Unpublished data, 1945.

Crops under Irrigation for Winter Grazing by Sheep.

J. S. Starke, Agricultural Research Institute, University of Pretoria.*

IN the research associated with the production of sucker lambs under irrigation at the Losperfontein Experiment Station, the problem of providing suitable and adequate feed for the sheep had to be investigated, in addition to the problems connected with the type of sheep and their management.



Sheep on pasture.

Losperfontein is under the Hartebeespoort Irrigation Scheme, situated in the Brits district, north of the Magaliesberg range of mountains. Since the natural bushveld is infested with ticks, including the bont tick, *Amblyomma hebraeum*, the transmitter of heartwater in cattle and sheep, it was considered necessary not to allow the sheep to graze on the natural veld, but to provide all the feed in the form of grazing and hay from the cultivated lands. Thus both summer and winter grazing-crops had to be grown, as well as hay crops for feeding in dry lot during and after rains, when the black turf soil became so sticky that the sheep had to be removed from the lands in order to avoid damaging the pasture. Owing to the scarcity and high cost of land under irrigation, it was necessary that the same lands should produce both winter and summer crops each year.

Considerably more feed of high nutritive value was required during the winter than during the summer season, as autumn and winter lambing was practised. The winter crops were fully used to provide succulent grazing for the lactating ewes and their growing

* Formerly Officer-in-Charge, Losperfontein Experiment Station.

lambs, whilst the summer crops were used for producing hay in addition to providing the necessary grazing for the dry ewes.

The results obtained from the grazing of the winter crops only are discussed in this article. The period under review extends over the four winter seasons of 1939 to 1942.

Preparation of Lands.

The ground was ploughed immediately after the removal of the preceding crop. After being allowed to weather for a few days the ploughed land was disked and harrowed in one operation. Thereafter beds, twelve feet in width, were made by means of a tractor-drawn V-shaped drag. The ground was then ready for seeding, which was usually done by hand. A final disking and harrowing followed to cover the seed, prior to the first irrigation, which was done immediately after seeding.

In the 1939 and 1940 seasons fertilizer was applied at the rate of 200 lb. superphosphate (17.1 per cent.) per morgen to the winter crops following a summer legume, and in addition 100 lb. sulphate of ammonia, when following a summer cereal. In the 1941 and 1942 seasons the winter crops received the above fertilizer treatment, only when following a summer cereal.

Irrigation of Winter Crops.

Several 0.75 cusec streams of water were used for irrigating the lands. The streams ran both day and night when the sluices of the irrigation canal were open. As far as possible irrigation by night was avoided by collecting and storing the water running during the night in earthen dams for irrigation the following day.

A summary of the results of the irrigation of the winter crops during the three years 1939, 1940 and 1941 is given in the following table. The 1942 irrigations are not included as the season was incomplete.

TABLE I.—*Irrigation of winter crops.*
(Average of three years on different blocks of lands.)

Land block.	Morgen.	1st Irrigation, hours/morgen.	SUBSEQUENT IRRIGATIONS.				Rain-fall (ins.)	(1) Irrigation water (ins.)	(2) Total water per 180 days. (ins.)	(3) Total sheep-days per morgen.	(3) Sheep-days per morgen per inch water.
			Num-ber.	Hours/morgen.	Inter-val between irrigations (days).	Crop-ping pe-riod (days).					
R.....	11.2	17.8	6.2	10.2	25.8	179	6.52	28.41	34.93	2,175	64.4
B.....	9.3	18.2	5.0	9.4	32.3	188	6.72	22.80	28.26	2,634	87.9
H.....	22.4	18.9	5.0	9.4	30.8	178	6.77	23.40	30.39	2,423	81.8
S(a)...	8.3	16.8	5.0	10.4	29.2	183	7.47	24.13	31.11	2,752	88.2
S(b)...	3.9	30.8	4.7	23.7	30.7	164	7.54	49.86	63.00	1,953	36.4
N (4)...	14.6	12.6	5.0	9.8	30.5	178	5.49	22.00	27.80	2,188	84.1
All ...	69.7	17.7	5.2	10.2	29.9	178	6.71	25.37	32.44	2,369	77.8

(1) 1 hour of irrigation per morgen with a $\frac{1}{2}$ cusec. stream is equivalent to 0.35" rainfall; conversely 1" rainfall=2.84 hours of irrigation per morgen.

(2) The total water, i.e. from irrigation and rain, was corrected to a standard cropping period of 180 days.

(3) Includes only the lands used entirely for grazing. The computation of sheep-days is discussed later in this article.

(4) Includes the results of one or two years only.

CROPS UNDER IRRIGATION FOR WINTER GRAZING BY SHEEP.

From Table I it will be seen that when the ploughed land was irrigated for the first time, an average of 17·7 hours of a $\frac{3}{4}$ cusec. stream was used per morgen. There were 5·2 subsequent irrigations with an average of 10·2 hours per morgen each. The average interval between the irrigations was 30 days and the average cropping period, i.e., from seeding till the final removal of the crop, was 178 days. During this period the lands received on an average 6·71 inches rainfall and 25·37 inches of irrigation.

A comparison of the water utilization on the different blocks of lands shows that S(b), which was a black turf soil of a calcareous nature, required considerably more water in the first and subsequent irrigations than the other blocks of lands. The yield from this calcareous black turf soil in terms of sheep-days was also the lowest; consequently it showed the poorest utilization of water, viz. 36·4 sheep-days per morgen per inch of water.

The block of land, which had the next lowest utilization of water, viz. 64·4 sheep-days per morgen per inch of water, was R, which was a red clay soil with a fair amount of loose stones. Although this red soil required no more than an average amount of water for its first irrigation, the intervals between irrigations were shorter, because the soil dried out so much sooner. The result was a higher water requirement during the cropping period. This, however, did not result in an increase in grazing capacity; hence the poor utilization of water as indicated above.

The soil in land blocks S(a) and N was a black turf which was typical of that area, whilst a mixed soil of varying grades between the red clay and black turf existed in blocks B and H. These soils showed the best utilization of water in terms of sheep-days per morgen per inch of water.

The Planting Season.

The sowing of the crops for winter grazing usually commenced about the middle of February and terminated towards the end of May.

TABLE II.—*Duration of the planting season.*

Year.	Total area sown.	Date of first sowing.	MORGEN SOWN IN DIFFERENT MONTHS.				Date last sowing.
			Febru-ary.	March.	April.	May.	
1939....	50·3	March 1.....	—	30·9	8·4	11·0	June 2.
1940....	70·1	February 23.	6·1	20·6	29·9	13·5	May 20.
1941....	74·4	February 11.	14·0	19·0	28·0	13·4	June 5.
1942....	75·1	February 18.	16·9	11·7	29·3	17·2	May 28.

As it was the practice to place the ewes with lambs on winter grazing soon after lambing, it was found desirable to have the first lands sown and irrigated before the middle of February in order to ensure grazing for the early lambs by mid-April.

Planting was continued at regular intervals throughout March, April and May to supply fresh grazing throughout the months of June, July and August. With the completion of the planting season and the onset of winter, an increasing acreage under winter grazing became available, and this was supplemented by the second grazing of the paddocks sown earlier. Consequently, a regular increase in

grazing area accompanied the steadily increasing feed demands of the lambs growing in size and numbers, and also offset the reduced rate of plant growth during the colder winter months.

The main crop sown for winter grazing was Algerian oats. Other winter crops, such as barley, wheat, Burt oats, and a mixture of oats and vetches were sown on a more limited scale in comparative trials with Algerian oats.

The rate of seeding of oats varied from 90 lb. to 130 lb. per morgen. Owing to the excessive weed growth during the summer months, the higher rate of seeding was found to be necessary in the early sowings. As the competition from weeds became less with the onset of cooler weather, the rate of seeding was gradually reduced to about 100 lb. per morgen in April and May.

Interpretation of Grazing Results.

The winter crops were grazed by sheep only. The sheep remained on the pasture day and night continuously, except during spells of wet weather when they were fed in dry lot, and once every fortnight when they were removed overnight for weighing. The transfer of sheep from one paddock to another was invariably done in the early morning.

The grazing capacity of the pasture was expressed in terms of sheep-days. A full-grown sheep, weighing approximately 100 lb. and remaining for a day and night on the pasture, constituted one sheep-day. It was impracticable to record the gain or loss in weight whilst grazing each paddock. This was not a serious source of error in determining the grazing capacity of the pasture, as the mature sheep maintained their live weights at a more or less even level throughout the year.

When ewes suckling lambs grazed the crops, an allowance had to be made for the increased feed consumption of the lactating ewe as well as for that of the growing lamb. The higher feed requirements of the ewe are required for conversion into milk, which, in addition to a certain amount of pasturage, is consumed by the lamb for its own needs. As the lactation of the ewe advances, the milk production declines, but this is more than offset by the increased pasturage consumption of the growing lamb. The daily feed requirements of the suckling lamb can be regarded as a composite measure of the increased pasturage consumption by the ewe for milk production and of the lamb's own consumption.

Armsby's feeding standards⁽³⁾ for the daily requirements of growing lambs are adapted in terms of total digestible nutrients (T.D.N.) in the following table. It was found that the lambs at Losperfontein gained on an average $\frac{1}{2}$ lb. in weight per day.

Weight of lamb.	lb. T.D.N. for maintenance.	Age (months)	lb. T.D.N. for $\frac{1}{2}$ lb. gain.	Daily T.D.N. requirements.
15	0.24	0-1	0.61	0.85
20	0.29	0-1	0.63	0.92
30	0.38	1-2	0.65	1.03
40	0.46	1-2	0.68	1.14
50	0.53	2-3	0.71	1.24
60	0.60	2-3	0.74	1.34

From the results of various research workers the daily maintenance requirements of a 100 lb. sheep, representing one sheep-day, can be regarded as approximately 1.1 lb. T.D.N.⁽⁴⁾ Thus the daily

CROPS UNDER IRRIGATION FOR WINTER GRAZING BY SHEEP.

feed requirements of suckling lambs gaining $\frac{1}{2}$ lb. per day can be expressed in terms of sheep-days as follows:—

Age of lamb.	Weight.	Equivalent in sheep-days.
0-1 month.....	10-25 lb.	0.625
1-2 months.....	25-40 lb.	0.875
2-4 months.....	40-60 lb.	1.125

In the above schedule the equivalent of the suckling lamb's requirements in terms of sheep-days is slightly lower than that determined by Armsby's standards. It was considered advisable to be somewhat conservative until such time as more accurate information on the feed consumption of a lactating ewe and her lamb is determined.

The figure representing the grazing of the lambs plus the increased pasturage consumption of the ewe for milk production, is added to the sheep-days in respect of the ewes for maintenance, to give the total grazing capacity of the land in terms of sheep-days.

In addition to recording the dates of commencement and completion of the grazing on each paddock and the number and type of sheep, notes were made on the state of the pasturage and representative samples taken before grazing commenced. The representative samples were cut from inside a wooden frame, one yard square, which was dropped at random throughout the field. Five such samples were taken per morgen of pasture. The green weight of pasture cut from each sample area was recorded and a smaller sample taken for chemical analysis.

Results of Grazing with Oats.

Winter grazing usually commenced in the middle of April and terminated at the end of October, i.e., it extended over a period of $6\frac{1}{2}$ months. During November the winter cereals grew poorly and tended to seed prematurely. However, the early summer crops, sown during the latter part of August, were already available for grazing at this time.

A summary of the results obtained with the Algerian oats over the four years is given in Table III. The data from the first and subsequent grazings are indicated separately; in addition the total amount of grazing obtained is given. Unfortunately all the lands were not grazed the same number of times, for the reason that certain lands had to be prepared from August onwards for the summer crops.

During the 1940, 1941 and 1942 seasons the pasturage was grazed in the desirably young and succulent stage, whereas during 1939 grazing commenced only at a more advanced stage of growth, when the plants had already started to pipe.

From Table III it will be seen that, on the average, grazing commenced 76 days after planting. The interval between subsequent grazings became less and less with the advance of the season, viz. 55 days between the 1st and 2nd grazings, 41 days between the 2nd and 3rd grazings, and only 29 days between the 3rd and 4th grazings.

The sheep were kept on the paddocks for a relatively short time, viz. 12 days in the case of the first grazing and 8 days in the case of subsequent grazings. It was considered desirable to use a suffi-

ciently large number of sheep to complete the grazing of the crops in about a week's time. The advantages of using a high concentration of stock for a short grazing period are: (1) less chance of the

TABLE III.—*Summary of Algerian oats grazing.*

(Averages for each year.)

1st Grazing.

Year.	Morgen grazed	Number of camps.	Growth period (days).	Grazing period (days).	Sheep-days per morgen.	lb. per sq. yd.	Per cent. protein.	Per cent. P ₂ O ₅ .
1939.....	44.8	24	102.2	19.1	1,550.3	1.99	11.21	0.467
1940.....	64.4	31	69.2	10.2	1,094.2	1.36	14.61	0.580
1941.....	57.5	29	64.7	8.6	969.6	1.33	15.78	0.554
1942.....	60.4	31	72.7	9.5	965.5	—	—	—
AVERAGE.....	—	—	76.4	11.6	1,123.3	1.54	14.03	0.539

2nd Grazing.

Year.	Morgen grazed	Number of camps.	Growth period (days).	Grazing period (days).	Sheep-days per morgen.	lb. per sq. yd.	Per cent. protein.	Per cent. P ₂ O ₅ .
1939.....	27.0	16	49.8	13.6	1,072.0	1.69	9.85	0.502
1940.....	53.9	26	49.5	8.2	675.9	0.82	12.34	0.577
1941.....	48.2	25	61.3	7.8	735.2	1.03	12.88	0.512
1942.....	43.4	22	58.8	6.9	754.6	—	—	—
AVERAGE.....	—	—	55.1	8.8	783.2	1.09	11.98	0.537

3rd Grazing.

Year.	Morgen grazed	Number of camps.	Growth period (days).	Grazing period (days).	Sheep-days per morgen.	lb. per sq. yd.	Per cent. protein.	Per cent. P ₂ O ₅ .
1939.....	8.6	6	22.6	4.5	402.9	0.82	13.94	0.732.
1940.....	31.1	15	41.7	7.5	631.9	0.77	11.70	0.649
1941.....	15.7	17	39.9	9.6	584.1	0.85	12.67	0.574
1942.....	10.4	6	63.1	9.3	690.9	—	—	—
AVERAGE.....	—	—	40.9	8.1	590.2	0.81	12.37	0.627

4th Grazing.

Year.	Morgen grazed	Number of camps.	Growth period (days).	Grazing period (days).	Sheep-days per morgen.	lb. per sq. yd.	Per cent. protein.	Per cent. P ₂ O ₅ .
1940.....	10.6	5	28.0	9.0	534.7	0.59	13.75	0.866
1941.....	5.0	3	29.7	4.7	493.7	1.34	12.96	0.752
AVERAGE.....	—	—	28.6	7.4	519.3	0.74	13.59	0.843

Total Grazings.

Year.	Morgen grazed.	Number of camps.	Times grazed.	Growth period (days).	Grazed period (days).	Crop-ping period (days).	Sheep-days per morgen.	lb. per sq. yd.	Per-centage protein.	Per-centage P ₂ O ₅ .
1939.	44.8	24	1.9	138.9	29.3	168	2,346	3.08	10.61	0.478
1940.	64.4	31	2.5	135.4	23.1	158	2,117	2.50	13.34	0.592
1941.	57.5	29	2.6	144.0	21.5	165	1,997	2.77	14.06	0.538
1942.	56.9	29	1.9	128.0	16.6	145	1,663	—	—	—
Av.	—	—	2.2	136.6	22.4	159	1,984	2.76	12.67	0.536

sheep feeding selectively, which results in a more uniform removal of the pasturage; (2) less chance of the pasturage becoming fouled; (3) less chance of the land remaining too long without an irrigation; (4) less chance of internal parasitic infection; and (5) sheep feed much better with a change of pasture. Long paddocks of about 2 morgen in size and flocks of 150 to 200 sheep were found to be the best at Losperfontein.

It can further be seen from Table III that the carrying capacity also decreased with each subsequent grazing. The first grazing supplied the highest grazing capacity of 1,123 sheep-days per morgen; thereafter the grazing capacity declined to 783, 590 and 519 sheep-days per morgen for the 2nd, 3rd and 4th grazings, respectively.

The total amount of grazing supplied by the oats during its cropping period is given at the foot of Table III. It will be seen that on the average the oat lands were grazed 2.2 times. The oat pastures in general were capable of being grazed a greater number of times, but some had to be ploughed at an early stage in order to prepare the ground for the ensuing summer crop. The average length of cropping period of a paddock was 159 days, 22 days of which were taken up by the grazing sheep. During this time 1,984 sheep-days were obtained from a morgen of oat pasture. This means that the oat pasturage had a carrying capacity of 12.5 sheep per morgen.

A comparison of the grazing results obtained during the different years shows that the highest grazing capacity was obtained in 1939. This is due to the fact that the pasturage was grazed at a more advanced stage of growth, viz. 102 days after planting, whereas in the other years the pasturage was less than 70 days old when grazed for the first time. Although an increased grazing capacity was obtained in 1939, the pasturage was less palatable and had a lower feed value (see Table III). The first and second grazings of the oats in 1939 gave high yields, but thereafter the crop petered out, probably due to the fact that the oats were grazed at too advanced a stage of growth in the beginning.

In 1941 the oats were grazed for the first time as early as 65 days after sowing. The second grazing was delayed considerably, viz. after a growth period of 61 days, possibly as a result of grazing too early in the first instance, which did not permit the plants to become firmly established.

In the 1942 season the pasturage was not fully utilized, as the research work ceased during the latter part of the season.

Where pasturage of high quality and for an extended grazing season is required, it would appear that oats under irrigation should be grazed for the first time about $2\frac{1}{2}$ months after planting, with subsequent intervals of about $1\frac{1}{2}$ months between grazings, decreasing to one month towards the end of the season.

It can be seen in Table III that the oats had an average protein content of 12.67 per cent. and a P_2O_5 content of 0.536 per cent. (expressed on a dry matter basis). According to Beeson⁽⁵⁾ a lactating ewe requires in its dry ration a P_2O_5 content of 0.49 per cent. (0.21 per cent. P) of the dry matter. The phosphate content of the oat pasturage, fertilized with superphosphate, can be considered adequate for suckler-lamb production.

The oat pasture had the highest protein content when grazed for the first time. Fortunately this coincides with the time, shortly

after lambing, when the protein requirements of the lactating ewe and young growing lamb are at their highest.

According to the Morrison feeding standards⁽⁶⁾, a 100 lb. lactating ewe requires per day 2.9 to 3.2 lb. dry matter and 0.27 to 0.29 lb. digestible protein. This means that the ration should contain 9 per cent. digestible protein or 12 per cent. protein on a dry matter basis. (The protein in young oat pasturage can be taken to have a digestibility coefficient of 75 per cent.). In 1939 the oat pasture had a protein content of only 11.21 per cent. when first grazed and 10.61 per cent. for the whole season; during 1940 and 1941 the oats, when first grazed, had a protein content of approximately 15 per cent. and an average of between 13 and 14 per cent. for the whole season.

The somewhat disappointing growth rate of the lambs during the 1939 season as compared with the following seasons can be ascribed to the low protein content of the pasturage, accompanied by a decrease in palatability.

It can thus be seen that in sucker-lamb production every effort should be made to give the ewe and her lamb the best of the available grazing. For this reason it was frequently considered necessary to remove the ewes with lambs to fresh pasturage whilst non-productive dry ewes were used to clean up the remainder of the grazing.

Oats Compared with Wheat for Grazing.

A comparison was made in 1939 between Rooikleinkoring and Algerian oats for sheep grazing in three pairs of paddocks sown late in May. The paddocks were paired off with regard to type of soil and previous treatment; each pair, sown to oats and wheat, received similar treatment with regard to time of planting, cultivation and irrigation.

TABLE V.—Average grazing results of Algerian oats and Rooikleinkoring.

Grazing.	Area morgen.	Number of camps.	Days' growth.	Sheep- days per morgen.	lb. per sq. yd.	Per- centage protein.	Per- centage P ₂ O ₅ .
Oats:—							
1st.....	5.1	3	93	1,344	2.42	15.27	0.555
2nd.....	5.1	3	33	1,234	1.82	12.24	0.669
TOTAL.....	—	—	126	2,578	4.24	—	—
Wheat:—							
1st.....	5.5	3	76	938	1.87	16.72	0.705
2nd.....	3.3	2	34	898	1.45	12.34	0.602
TOTAL.....	—	—	110	1,836	3.32	—	—

The wheat was fit to be grazed fully two weeks earlier than the oats but supplied only 938 sheep-days per morgen in comparison with the 1,344 sheep-days per morgen for the oats. The second grazing of the oats was also better than the second grazing of the wheat. The feed value of the wheat pasturage tended to be slightly better than that of the oats.

A further comparison between Red Egyptian wheat and Algerian oats made in 1942 on one pair of paddocks is given in Table VI.

CROPS UNDER IRRIGATION FOR WINTER GRAZING BY SHEEP.

TABLE VI.—*Algerian oats versus Red Egyptian wheat.*

Grazing.	OATS.		WHEAT.	
	Days' growth.	Sheep-days per morgen.	Days' growth.	Sheep-days per morgen
1st.....	77	977	71	733
2nd.....	68	1,103	48	625
TOTAL.....	145	2,080	119	1,358

The Algerian oats again showed a higher grazing capacity, particularly with the second grazing, but had a longer growing period.

It can be concluded that, where a winter crop for grazing only is required, Algerian oat pasturage is preferable to wheat, particularly if two or more grazings are desired.

Barley and Oats Compared.

In 1941 three paddocks (5.0 morgen) sown to Cape Six-Row barley in February were compared with three similar paddocks (5.1 morgen) of Algerian oats for early grazing by sheep during the winter period. The results given in Table VII represent the average of the paddocks.

TABLE VII.—*Grazing capacity of barley compared with oats.*

Grazing.	OATS.		BARLEY.	
	Days' growth.	Sheep-days per morgen.	Days' growth.	Sheep-days per morgen.
1st.....	53.3	997.8	60.3	932.6
2nd.....	54.3	899.5	27.0	452.2
3rd.....	45.3	592.0	35.7	289.9
TOTAL.....	153.9	2,489.3	123.0	1,724.7

There was no appreciable difference in the grazing capacities of the oats and barley when grazed for the first time. In the subsequent grazings the oats had a far higher grazing capacity, with the result that its total grazing capacity was significantly greater than that of the barley ($P < .01$). The periods of growth before the 2nd and 3rd grazings were much shorter for the barley than in the case of the oats. This was due to the tendency of the barley to shoot into ear at an early stage—an undesirable characteristic in a grazing crop. The protein and P_2O_5 contents of the barley and oat pasturage were found to be similar.

Burt Oats Compared with Algerian Oats for Grazing.

Two paddocks of Burt oats were compared in 1942 with two similar paddocks sown to Algerian oats; a summary of the results is given in the following table.

TABLE VIII.—*Grazing results of Burt and Algerian oats.*

Grazing.	ALGERIAN.		BURT.	
	Days' growth.	Sheep-days per morgen.	Day's growth.	Sheep-days per morgen.
1st.....	67	985	59	901
2nd....	64	1,014	43	631
3rd.....	68	675*	48	447
TOTAL.....	199	2,674	150	1,979

* Only one paddock.

The Burt variety is more upright-growing than the Algerian. Consequently the Burt oat pasturage was fit for grazing sooner than the Algerian. Judged by the eye it appeared to have a better growth, but when grazed it did not have the same carrying capacity as the Algerian oats. The difference in favour of the Algerian oats was more marked in the second and third grazings with the result that its total grazing capacity was greater than that of the Burt variety.

Oats and Vetches as a Grazing Crop.

In the 1940, '41 and '42 seasons a combination of oats and vetches was tried out as a grazing crop for sheep. Sowing was done towards the end of the planting season, i.e., in May, at the rate of 110 lb. oats and 25 lb. vetches (purple) per morgen.

The results for the 1940 and 1941 seasons are averaged in Table IX. The 1942 results are not included, as the trial was discontinued after the first grazing. During the two years 17·6 morgen in 9 paddocks were sown to oats and vetches, and 17·8 morgen in 9 comparable paddocks to oats alone.

TABLE IX.—*Oats and vetches as grazing.*

Grazing.	OATS.				OATS + VETCHES.			
	Days' growth.	Sheep-days per morgen.	Per cent. protein.	Per cent. P ₂ O ₅ .	Days' growth.	Sheep-days per morgen.	Per cent. protein.	Per cent. P ₂ O ₅ .
1st.....	71·0	981·9	16·17	0·531	80·2	981·9	17·75	0·548
2nd.....	55·0	871·1	13·47	0·604	42·2	1,188·8	17·26	0·627
3rd.....	35·8	569·0	12·89	0·679	35·6	790·6	20·37	0·664
TOTAL...	161·8	2,422·0	—	—	158·0	2,961·3	—	—

The total grazing capacity of the oats plus vetches was significantly greater than that of the oats sown alone ($P < 0.05$).

The oats and vetch mixture required a longer growing period, viz. 80 days, before it was grazed for the first time, in comparison with 71 days for the oats alone; but there was no difference in the resulting grazing capacity. In the subsequent grazings the oats-vetch combination proved to have a higher grazing capacity than the oats alone ($P < 0.05$).

A glance at Table IX shows that oats + vetches had a higher protein percentage than oats alone. Although the protein percentage

CROPS UNDER IRRIGATION FOR WINTER GRAZING BY SHEEP.

in the oat pasturage decreased with each subsequent grazing, there was actually an increase in the protein content of the oats-vetch mixture. This can be ascribed to the increasing proportion of vetches, a legume, in the pasturage of the second and third grazing. The following proportions by weight of oats and of vetches were obtained in the pasturage of one land sown to the oats-vetch combination.

	% Oats.	% Vetches.
1st Grazing	81	19
2nd Grazing	74	26
3rd Grazing	45	55

The increasing proportion of vetches can be accounted for by the preference shown by the sheep for the oats when grazing. At first the sheep did not graze the vetches at all but learnt to do so afterwards. Vetch hay, however, was eaten readily by the sheep.

The oats and vetch mixture not only gave a higher grazing capacity in the second and third grazing, but it was also capable of providing additional grazing right into December; on the other hand the oats grazing was very inferior after the end of October under the conditions prevailing at Losperfontein.

The use of vetches in combination with oats for winter grazing is to be recommended. It will fill the long-felt want of a suitable winter legume for the stock farmer.

Oat Hay and Grain After Grazing.

Towards the end of the winter season it was possible to produce a grain or hay crop from the surplus grazing. In most cases the oats had been grazed once (or even twice) during the late autumn or winter.

The following average yields of hay cut or grain harvested in October and November, and of aftermath grazing, were obtained.

Area in morgen.	Number of camps.	First grazing, sheep- days per morgen.	Days' growth after grazing.	Yield per morgen.	After- math, sheep- days per morgen.	Per cent. protein of hay.	Per cent. P ₂ O ₅ of hay.
Hay..... 15.1	8	850.1	93	3.3 tons	324.1	6.36	0.396
Grain..... 11.9	6	779.9	118	15.5 bags.	183.2	—	—

Summary of Results and Conclusions.

(1) The winter grazing crops, of which Algerian oats was the most important, supplied grazing under irrigation from the middle of April until the end of October.

(2) During the cropping period of 178 days the winter crops received on the average 6.71 inches rainfall and 25.37 inches of irrigation (average of 3 years).

(3) The typical black-turf and mixed soil types at Losperfontein showed more efficient utilization of irrigation water in terms of grazing capacity than the calcareous black turf or red clay soils.

(4) Algerian oats have been shown to be superior to barley and probably to Burt oats and wheat (Rooikleinkoring and Red Egyptian) as a winter grazing crop under irrigation for sheep. The Algerian oat was not such a fast grower but had a greater grazing capacity, particularly when two and more grazings were required.

(5) The oats furnished on the average 1,123 sheep-days per morgen with the first grazing $2\frac{1}{2}$ months after planting; 783 sheep-days per morgen in the second grazing of 55 days' growth, and 590 sheep-days per morgen in the third grazing of 40 days' growth.

(6) A total of 1,984 sheep-days per morgen was obtained from the oats in 159 days (average of 4 years). This is equivalent to a carrying capacity of 12.5 sheep per morgen.

(7) A combination of oats and vetches proved to be successful as a grazing crop. The combination gave an increase in grazing capacity and feeding value of the pasturage over that of oats alone, as well as an extension of the grazing season into December.

(The grazing results with the summer crops will be discussed in a subsequent article.)

Acknowledgements.—The chemical analyses of the pasturage samples were undertaken by the Division of Chemical Services to whom we are much indebted. Dr. H. W. Turpin and Mr. G. S. Maré of the Division of Agricultural Education and Research are to be thanked for their guidance and interest in the work at the Experiment Station; and the Losperfontein staff for their willing assistance and co-operation in the routine work, particularly Mr. J. F. Peens for the first compilation of the tables, Mr. G. J. Wagenaar for his supervision in the production of the crops, and Mr. F. A. le Grange for recording the grazing results.

LITERATURE.

- (1) STARKE, J. S.—Sucker Lamb Production under Irrigation, *Farming in South Africa*, Vol. XVII, July 1942.
- (2) BONSMAN, F. N.—Milk Production Studies with Sheep, *Farming in South Africa*, Vol. XIX, May 1944.
- (3) ARMSBY, H. P.—The Nutrition of Farm Animals, 1922.
- (4) SMUTS, D. AND MARAIS, J.—Onderstepoort Journal, Vol. 13, 1939.
- (5) BEESON, W. M.—Calcium and Phosphorus Requirements for Ewes, 37th Ann. Mtg. Amer. Soc. An. Prod., 1944.
- (6) MORRISON, F.—Feeds and Feeding, 1936.

Phenothiazine: A Remedy for Internal Parasites:—

[Continued from page 250.]

If the doses for a number of pigs are mixed with the feed where pigs feed together out of a trough, some animals may ingest more than the prescribed dose, with the result that undesirable symptoms, such as inco-ordination or even partial paralysis of the hindquarters or temporary blindness may appear.

Fowls.

The drug is very effective against caecal worms, and, to a large extent also against *Ascaridia* in fowls. The dose is 0.5 gram per fowl. It may be mixed with the feed or, better still, administered in the form of a tablet; a quarter of a pound mixed with the quantity of feed which fowls will eat up within half an hour or less, will be sufficient for approximately 200 to 250 fowls.

Warning.

Except in the case of horses, there is very little danger of poisoning, for in most cases, other animals can take in much more than the prescribed dose without any harmful effects. Care must, however, be taken with horses, especially thoroughbreds, and a veterinary surgeon should administer the dose; in no circumstances should horses be given more than the prescribed dose, since they are inclined to develop anaemia.

[Continued on page 275.]

The Weaning of Piglets at an Early Age.

W. A. Verbeek, Animal Husbandry Research Officer, Vaalhartz Experiment Station.

THE milk production of a sow plays an important part in the growth of her piglets, since during the first eight weeks, the young pigs are mainly dependent on mother's milk for their food. Research by the former Faculty of Agriculture of the University of Pretoria (now the Agricultural Research Institute) revealed that under favourable conditions Large White sows with litters of 8 piglets yielded an average total production of 510 lb. of milk over a period of 8 weeks. The average milk production per day increased from 6.9 lb. during the first week to 10.5 lb. during the third week, with a gradual decrease subsequently to 7.9 lb. during the eighth week. The production of so much milk is an exacting function and a drain on the sow's system; good feeding is, therefore, absolutely essential for suckling sows to ensure a good flow of milk and to prevent too great a deterioration in the sow's condition. Only after her piglets have been weaned, can a sow be served again and regain condition, and for this reason the weaning of piglets should not be delayed unnecessarily. At 8 weeks, piglets can utilize other foods to very good advantage and that has also been found to be a very suitable age at which to wean them.

Piglets start eating on their own from the third week and their growth can be considerably promoted by supplementing the milk with additional creep feeding (in the form of concentrates or skim milk, for instance) as soon as possible. In Russia it is the practice to give thoroughbred piglets extra cow's milk from the age of 7 to 10 days, gradually decreasing this ration and substituting skim milk from the age of 30 to 35 days, concentrates being fed from the third week.

Can Piglets be Weaned at Three Weeks.

In the case of very valuable sows, or in other special cases, piglets may possibly be weaned to advantage at an earlier age in order to conserve the sow's strength so that she will be ready to be served sooner. An experiment was carried out on two litters at the Vaalhartz Experiment Station, with a view to ascertaining whether the growth of piglets weaned at approximately three weeks is adversely affected, as compared with that of piglets weaned at 8 weeks.

The details and results of the experiment are as follows:—

Two closely related Large White sows (Nos. 1 and 89) farrowed by the same Large White boar on 14 and 15 May, 1945. No. 1's litter consisted of 7 piglets, while No. 89 had a litter of 13, four of which were removed, 1 piglet being given to sow No. 1, leaving each sow with 8 piglets. At the age of 23 days, 4 piglets were removed from sows No. 1 and No. 89 each and weaned, while the remaining 4 piglets of sow No. 1 were given to sow No. 89 to rear with her own 4 remaining piglets. When the piglets were removed from the sows, the 4 piglets of sow No. 1 were given teats of sow No. 89 corresponding in position to those with which they had been suckled by their mother (No. 1). The 8 piglets which were weaned, were divided into two comparable groups of 4 each, one of which (A1) received cow's milk, skim milk and concentrates, whereas the other group (A2) was given only cow's milk and concentrates. The 8 piglets with sow No.

S9 (group B) were fed additional concentrates *ad lib* in a creep. (Milk from Friesland cows was used in this experiment.)

Treatments.

Group A1 (4 piglets):

From birth to the age of 23 days: Mother's milk.

At the age of 24 to 29 days: 5 pints cow's milk 4 times a day.

At the age of 30 to 36 days: 3 pints of cow's milk 3 times a day, plus $\frac{1}{2}$ lb. concentrates; and 4 pints of skim milk 3 times a day.

At the age of 37 to 56 days: 9 pints of skim milk, increased to 12 pints per day, plus concentrates (1 lb. gradually increased to 5 lb. per day) mixed with the skim milk. Dry concentrates were also given *ad lib* and at the end of the experiment the piglets were consuming 4 lb. per day.

The concentrates for this group consisted of: Yellow mealie meal (70 parts), oatmeal (10 parts), groundnut oilcake meal (10 parts), lucerne meal (10 parts) with 2 per cent. bonemeal and 1 per cent. salt. The fibre content was 5 per cent.

Group A2 (4 piglets):

From birth to the age of 23 days: Mother's milk.

At the age of 24 to 29 days: 5 pints of cow's milk 4 times a day.

At the age of 30 to 43 days: 3 pints of cow's milk 3 times a day, plus 1 lb. concentrates gradually increased to 4 lb. per day.

At the age of 44 to 56 days: 4 lb. concentrates increased to 6 lb., mixed with water. Dry concentrates were given *ad lib*, and at the end of the experiment the piglets were consuming 4 lb. per day.

The concentrates were composed of the following: Yellow mealie meal (60 parts), oatmeal (10 parts), groundnut oilcake meal (10 parts), fishmeal (10 parts), lucerne meal (10 parts) with 2 per cent. bonemeal and 1 per cent. salt. The fibre content was 5 per cent.

Group B (8 piglets):

From birth to the age of 30 days: Mother's milk.

At the age of 31 to 56 days: Mother's milk plus dry concentrates in a creep, *ad lib*. At the end of the experiment they were consuming 12 lb. per day. The composition of the concentrates ration was the same as that of group A1 above.

Post-experimental period.—In order to compare the growth of the piglets of the various groups for a further period, all the piglets were placed together in one camp where they received the same feed, viz., concentrates plus skim milk.

Throughout the experimental and post-experimental periods the piglets received a small amount of green oats daily.

Results.

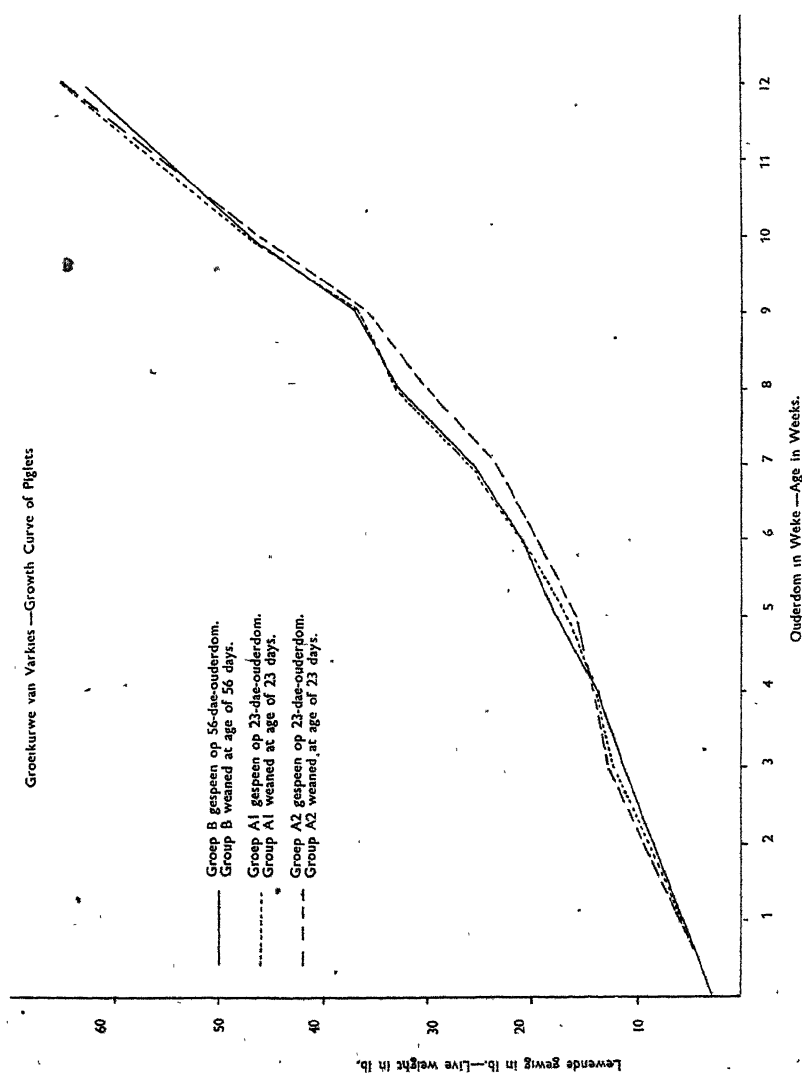
Increase in live weight:—

	Group A1.	A2.	B.
Number of piglets in group.....	4	4	8
Average birth weight (lb.).....	2.8	3.0	2.9
Average weight at 3 weeks (lb.).....	12.4	12.6	11.2
Average weight at 8 weeks (lb.).....	33.0	30.0	32.8
Average daily weight increase at 8 weeks (lb.).....	0.54	0.48	0.53
Average weight at 12 weeks (lb.).....	64.8	64.8	62.9
Average daily increase up to 12 weeks (lb.).....	0.74	0.74	0.71

THE WEANING OF PIGLETS AT AN EARLY AGE.

Feed consumption up to age of 8 weeks:—

	Group A1.	A2.	B.
Cow's milk, total in gallons.....	6.375	9.0	—
Cow's milk per pig, in gallons.....	1.59	2.25	—
Skim milk, total in gall.....	31.25	—	—
Skim milk, per pig.....	7.81	—	—
Concentrates, total fed wet (lb.).....	63.0	76	—
Concentrates per pig (lb.).....	15.75	19.0	—
Concentrates, total fed dry (lb.).....	28.0	29.0	87.0
Concentrates per pig (lb.).....	7.0	7.25	10.9
Concentrates, total consumption (lb.).....	91.0	105.0	101.0
Concentrates per pig, total consumption (lb.)	22.75	26.25	12.62



The results were analysed, but no significant difference between the weight increases of the 3 groups of piglets was obtained, up to the ages of 8 weeks or 12 weeks. The weight increases of the piglets were, therefore, equally good under the various treatments. An average weight of 30 lb. and over at the age of 8 weeks may be regarded as satisfactory and the hand-rearing of the piglets which were weaned at the age of 23 days in this experiment, was, therefore, successful. It will be seen from the accompanying graph that the difference in growth between the 3 groups up to the age of 12 weeks was consistently small and negligible.

As far as the feed consumption is concerned, there is very little difference in the consumption of concentrates per piglet between groups A and A2. It appears that the piglets of group A2 utilized their concentrates very effectively. The piglets of group B consumed considerably less concentrates, but as a supplement to mother's milk the concentrates undoubtedly promoted their growth.

It may be mentioned that the piglets drank the cow's milk eagerly after they had been weaned and that they enjoyed the concentrates from the start. The piglets were all healthy and lively throughout and at the conclusion of the experiment, when they were 8 weeks old, no perceptible differences in condition could be observed.

Sow No. 1 fell off comparatively little in condition after feeding her piglets for 3 weeks. She was served again 23 days after drying up. The condition of sow No. 89 had perceptibly deteriorated after she had fed her piglets for 8 weeks. She was also served again, however, 24 days after she had dried up, i.e. approximately 5 weeks after sow No. 1 had been served. (Unfortunately no scale was available for weighing the sows).

Cost of Feeding Piglets.

The costs of the feed consumed by the piglets of the various groups up to the age of 8 weeks, are compared below. For this purpose the following prices of the types of feeds used were taken (all per 100 lb.):—Yellow mealie meal (10s.), oatmeal (12s. 6d.), groundnut oilcake meal (10s.), lucerne meal (10s.) and fishmeal (30s.), cow's milk 1s. 6d. per gallon and skim milk 2d. per gallon. On this basis the concentrate mixtures of groups A1 and B cost 10s. 6d. per 100 lb. and those of group A2, 12s. 6d. per 100 lb.

	GROUP A1.		GROUP A2.		GROUP B.	
	Per pig.	Per litter of 8 pigs.	Per pig.	Per litter of 8 pigs.	Per pig.	Per litter of 8 pigs.
Concentrates	£ s. d. 0 2 5	£ s. d. 0 19 1	£ s. d. 0 3 3	£ s. d. 1 6 3	£ s. d. 0 1 4	£ s. d. 0 10 8
Milk.....	0 2 5	0 19 2	0 3 4	1 7 0	—	—
Skim Milk...	0 1 4	0 10 5	—	—	—	—
TOTAL....	0 6 2	2 8 8	0 6 7	2 13 3	0 1 4	0 10 8

The cost of feeding the piglets, with due regard to the cost of feed consumed by the sows from the time when they were served and became pregnant till the time when they were served again and became pregnant, after the piglets had been weaned, are briefly given below in order to indicate the profitability of the undertaking.

THE WEANING OF PIGLETS AT AN EARLY AGE.

The sows each received 12 lb. of concentrates per day while feeding the piglets, and 6 lb. per day each when pregnant and dry. In addition, the sows regularly received a small amount of green feed.

Cost of feed consumption of sows.

	Sow No. 1.	Sow No. 89.
No. of days fed.....	161	195
Concentrates consumed (lb.).....	1,004	1,506
Cost of concentrates at 12s. 6d. per 100 lb.....	£6 5 6	£9 8 0

Total feeding costs for sow and litter of 8 pigs for the various groups.

	Group A1.	Group A2.	Group B.
	£ s. d.	£ s. d.	£ s. d.
Litter.....	2 8 8	2 13 3	10 10 8
Sow.....	6 5 6	6 5 6	9 8 0
TOTAL.....	8 14 2	8 18 9	19 18 8

The difference in feeding costs between groups A1 and A2 is small, although the use of skim milk reduces the costs. The feeding costs per piglet of group B are very low and show the small cost entailed in providing piglets with additional creep feeding. The total cost of feed consumed by the sow and litter of group B is higher than in the case where the piglets were weaned and the sow dried up sooner.

By weaning piglets at an early stage, more litters can probably be obtained from a sow per unit of time, and possibly also more litters during her lifetime.

Although the results of this experiment seem to indicate that piglets may be successfully weaned at an early age, it should be pointed out that the available data on this subject are still very limited.

The work is still in its initial stages and considerably more information over a period covering the whole production life of the sow is required before the economic value of this practice can be determined.

Experimental work is, therefore, being continued in order to obtain this information.

Acknowledgment.—The writer wishes to express his sincere gratitude to Mr. G. T. Rautenbach for the careful way in which he carried out this experiment.

Phenothiazine: A Remedy for Internal Parasites:—

[Continued from page 270.]

Animals suffering from anaemia or kidney, liver or heart trouble should not be treated with this drug.

Phenothiazine is insoluble in water, but slightly soluble in the intestinal juices. Therefore an animal which has been treated with the drug may, for the following few days, pass urine of a reddish colour, resembling that of the remedy itself. In dosing sheep, care must be taken to prevent staining of the wool for the discolouration may be permanent and the wool rendered unsuitable for marketing.

The remedy is not offered for sale by the Division, and consumers will have to order it, together with the dosing instruments, direct from registered dealers.

A Contagious Abortion in Horses.

Dr. M. W. Henning, Professor of Veterinary Science, University of Pretoria.

ABORTION in horses, a virus disease, has for many years been rife in America and Europe, where it has at times been responsible for very severe losses. Although it is possible that this disease has also occurred in South Africa in the past, this fact was not properly established before 1942, when contagious abortion broke out on a farm in the western Cape Province and was responsible for some 85 per cent. abortions in a stud consisting of just over 30 horses and donkeys. Last year a second, and very much more severe outbreak occurred at a military remount dépôt in Natal.

The disease usually breaks out very suddenly, and the origin or source of infection is obscure. After bringing about numerous abortions and ruining the foal crop, it generally vanishes in the same mysterious manner, and not a single case of abortion may occur for years. In America, where the disease is very much better known, experience has shown, however, that the disease may re-occur after four or five years.

The disease is caused by a virus and a bacterium (*Salmonella abortus-equi*) which may either singly or collectively bring about abortion. The bacterium is in no way related to the *Brucella abortus*, the causal factor of abortion in cattle. Evidently it cannot cause abortion in cattle, while the *Brucella abortus*, on the other hand, does not cause abortion in horses.

All equines, donkeys no less than horses, are susceptible to infection, but donkeys appear to have a greater resistance to abortion than horses.

In stallions, geldings and mules the disease manifests itself in the form of ulceration and suppuration of the joints. Even foals born alive of infected mares may suffer from this joint ill, to which they usually succumb after weeks of suffering. The *Salmonella abortus-equi* occurs in large numbers in the discharge from the ulcers.

Control and Treatment.

No form of treatment has been found to give good results. Nor is there a satisfactory vaccine which can be utilized for the control and prevention of the disease.

The sole control measure of any value at all is to improve the hygienic conditions under which the horses are kept, with a view to minimizing the transmission of infection. The use of individual breeding stables or paddocks for mares in foal is strongly recommended. Care should, however, be taken to ensure that the stableboys do not transmit the infection from one stable or paddock to another. The afterbirth and the dead foal must be destroyed immediately and the infected mare isolated.

Horse-owners noticing any cases of suspected contagious abortion in horses are advised to forward a piece of the liver and spleen of the foetus, as fresh as possible, in 50 per cent. glycerine, to Onderstepoort, as well as a specimen of the blood of the mare immediately after the abortion and again 14 days later.

Crops and Markets

A Statistical and Economic Review of South African Agriculture

by

The Division of Economics and Markets

Vol. 25

APRIL 1946

No. 284

CONTENTS

	PAGE
Price Review for February, 1946	277
Index of Prices of Agricultural and Pastoral Products	278
Prices of Slaughter Stock, 1946-47 Season	278
The Meat Control Scheme	279
Maximum Prices of Eggs	279
Maximum Prices of Chilled Eggs	279
The Argentine Maize Crop for 1945-46	280
Maximum Prices of Groundnuts 1945-46 Crop	280
Agricultural Conditions in the Union during February, 1946	280
Final Estimate of Expected Winter-Cereals, 1945-46 Season	281
Prices, Tables and Index	282

Price Review for February, 1946.

Fruit.—The markets were well supplied with apples, grapes, pears and watermelons, while fair supplies of pineapples, avocados and papaws were also offered. Towards the end of the month supplies of bananas and mangoes began to decrease.

Potatoes.—Potato supplies, especially from the Transvaal highveld were generally very large, with a resultant decline in prices. Supplies on the Cape Town market subsequently accumulated and a certain amount of decay set in.

Onions.—There were large supplies of Cape onions on the Cape Town and Johannesburg markets, with a relatively small supply at Durban. Prices generally increased.

Tomatoes.—Large supplies were offered on most markets, but the quality was inferior, resulting in a decrease in prices.

Vegetables.—Vegetable supplies were generally good, especially of green beans, green mealies and pumpkins.

Fodder.—The Johannesburg market was fairly well supplied with inferior and mixed lucerne hay, and prices consequently decreased. Due to the drought, supplies were very limited at other centres.

Poultry.—Poultry was fairly well supplied and the demand exceptionally good, but egg stocks generally were small.

Index of Prices of Agricultural and Pastoral Products.

THIS index (see table elsewhere in this issue) decreased from 174 in January to 171 in February 1946.

The index for "Hay" showed the biggest decrease, viz. from 191 to 158, mainly due to the decrease in the price of lucerne hay on the Johannesburg produce market, while the index for the group "Other Field Crops" decreased from 349 to 308 as a result of the decrease in the price of potatoes.

The index for "Dairy Products" decreased from 204 to 186, due to the seasonal decrease in the prices of butterfat, cheese and factory milk, while that for "Slaughter Stock" decreased from 179 to 175 as a result of the further seasonal decrease in the prices of slaughter cattle.

The only index which showed an increase was that of "Poultry and Poultry Products", viz. from 233 to 256, due to the increase in the price of eggs.

Prices of Slaughter Stock, 1946-47 Season.

PRODUCERS' prices of slaughter stock will remain unchanged for the 1946-47 season, excepting that the seasonal upswing in beef prices has been increased from the basic minimum of 10s. to 15s. per 100 lb. dressed weight, so as to encourage winter feeding.

During the coming season the upswing will then be at the rate of 6d. per 100 lb. dressed weight per week from June 17 until September 2, when the increase will be at the rate of 1s. per 100 lb. per week until October 28, from which date the full seasonal premium of 15s. per 100 lb. will be retained for some weeks. Thereafter, as conditions improve, prices will again be steadily reduced to the basic minimum price.

While the downswing was announced last year at the same time as the upward trend, for this reason the rate and timing of the downward movement will only be decided towards October, as the natural conditions prevailing at that time largely determine the downward trend.

Furthermore, the basic minimum price for the coming season has been reduced by 2s. 6d. per 100 lb. but the peak price, on the other hand, has been increased by 2s. 6d. per 100 lb. To implement this principle, it is accordingly announced that the basic minimum price for the 1945-46 season, which is reached on April 8, will fall by 1s. per 100 lb. on April 15 by a further 1s. on April 22, and by 6d. on April 29, i.e. the minimum basic price for the coming season will be 2s. 6d. per 100 lb. lower than that of the 1945-46 season, but on the other hand the peak price will be 2s. 6d. per 100 lb. higher, so that the average price during the two seasons will be more or less the same.

Producers' prices of sheep, lambs, and goats remain unchanged, as also the producers' prices of pigs, except that in respect of the latter the lowest-priced pigs described as "roughs" will be divided into two grades instead of just one.

Consumers' prices for all classes of meat remain unchanged.

The Meat Control Scheme.

Levy on slaughter animals.—As announced in the *Government Gazette Extraordinary* of 14 February 1946, the following levies have been imposed on slaughter animals slaughtered at all abattoirs and slaughtering places:—

Cattle.—6 months or older, 6d. per animal; under 6 months, 2d. per animal.

Sheep and goats.—2d. per animal.

Pigs.—2 months or older, 1s. per animal; under 2 months, 3d. per animal.

These levies remain unchanged as imposed on 1 August 1943 on cattle, sheep and goats, and on 10 July 1945 for the first time on pigs.

Interim meat scheme.—Since its inception in May 1944 the Meat Control Scheme has been partly administered under the Emergency Regulations under the Food Controller, and partly under the Livestock and Meat Industries Control Act (No. 48 of 1934).

A new interim scheme set up under the Marketing Act came into operation on 14 February 1946, but will, however, only serve until the necessary amendments to the Marketing Act have been made in order that it may accommodate the full proposed scheme.

For the new fixed meat prices under the scheme for the 1946-47 season see the article elsewhere in this issue.

Maximum Prices of Eggs.

THE maximum wholesale prices of eggs in the controlled areas, as fixed on 1 February 1946 (see March issue of *Crops and Markets*), have been increased by 3d. per dozen for all grades (excepting Grade III, mixed) as from 1 March 1946, while the retail prices have been increased by 4d. per dozen for all grades (excepting Grade III, mixed). (See *Government Gazette Extraordinary* of 1 March 1946.)

Maximum Prices of Chilled Eggs.

The following new maximum wholesale and retail prices for chilled eggs have been fixed for the Union as from 22 February 1946:

	Maximum Price per Dozen.	
	Wholesale.	Retail.
Grade 1.		
(a) Extra large	s. d. 2 5	s. d. 2 8
(b) Large	2 3	2 6
(c) Medium	2 1	2 4
(d) Small	1 11	2 2
Grade 2.		
(a) Large	2 1	2 4
(b) Medium	1 11	2 2
(c) Small	1 9	2 0
Grade 3.		
Mixed	1 10	1 10

These maximum prices are 1d. per dozen less for all grades than the corresponding prices as fixed on 2 February 1945.

(See *Government Gazette Extraordinary* of 22 February 1946.)

The Argentine Maize Crop for 1945-46.

IN view of the anticipated large demand for mealies during 1946-47, Argentine producers were encouraged to increase the acreage under cultivation during 1945-46 as much as possible. Notwithstanding this encouragement, however, it now appears that the acreage has actually decreased.

According to the first official estimate the acreage under cultivation is only 9,784,000 acres compared with 9,919,000 acres during the previous season when, as a result of drought, that crop was also a partial failure. The average acreage for the five years 1940-44 was 13,259,000 acres.

No reasons are given for this small acreage, although the shortage of fuel for tractors has apparently been a contributory factor.

During January the plants had already begun to deteriorate as a result of the prevailing drought conditions, and timely rains were urgently needed.

(Particulars obtained from *Broomhall's Corn Trade News* of 30 January 1946.)

Maximum Prices of Groundnuts, 1945-46 Crop.

THE maximum prices at which producers may sell groundnuts during the coming season are as follows:—

- (a) For unshelled groundnuts of any kernel content or grade—35s. per 100 lb. as against 30s. per 100 lb., the maximum fixed price of the previous season.
- (b) For shelled groundnuts of any grade—55s. per 100 lb. as against 50s. per 100 lb. during the previous season.

According to the final departmental crop estimate the 1944-45 season yielded a comparatively small crop, viz 96,800 bags of 100 lb. unshelled groundnuts. Prospects for the coming season seem more promising, provided climatic conditions remain favourable.

For details regarding the fixing of prices, see *Government Gazette Extraordinary* of 22 February 1946.

Agricultural Conditions in the Union during February, 1946.

Rainfall.—Drought conditions still prevailed in the north-western and south-eastern Cape Province, as well as in the Karoo.

Isolated showers fell in the Border area, Transkei and western Orange Free State, while good rains fell in practically the whole of the Transvaal and the northern and eastern Orange Free State.

Grazing and livestock.—In the drought-stricken areas grazing deteriorated considerably and heavy losses of stock resulted. The condition of stock in the other areas, however, was satisfactory except that the incidence of lumpy skin disease has become more widespread. Cases of this disease have been reported over the whole Orange Free State, as well as in the north-western districts of Natal and the Cape Province. Nagana also caused stock losses in Natal.

Crops.—In the northern areas, where good rains fell, prospects for summer crops such as mealies, kaffircorn, potatoes, peanuts and beans are very promising and in some parts excellent crops are even expected, provided these are not damaged by early frost or hail.

Final Crop Estimate of Expected Winter Cereals, 1945-46 Season.

ACCORDING to reports received from crop correspondents at the end of January and based on conditions prevailing during that month, the wheat, barley, oat and rye crops were estimated as follows as compared with the December estimates. (The threshing results of wheat and the final crop estimates for barley, oats and rye for the previous season are also given):—

WHEAT.

	Threshing results, 1944-45. (bags, 200 lb.)	December estimate, 1945-46. (bags, 200 lb.)	January estimate, 1945-46. (bags, 200 lb.)
Cape Province.....	2,665,000	2,376,000	2,311,000
Transvaal.....	491,000	436,000	409,000
Orange Free State.....	267,000	302,000	284,000
UNION, TOTAL.....	3,424,000	3,114,000	3,004,000

BARLEY.

	Final estimate 1944-45. (bags, 150 lb.)	December estimate, 1945-46. (bags, 150 lb.)	January estimate, 1945-46. (bags, 150 lb.)
Cape Province.....	738,000	528,000	529,000
Transvaal.....	66,000	72,000	69,000
Orange Free State.....	5,000	4,000	4,000
UNION, TOTAL.....	809,000	604,000	602,000

OATS.

	Final estimate 1944-45. (bags, 150 lb.)	December, Estimate, 1945-46. (bags, 150 lb.)	January, estimate, 1945-46. (bags, 150 lb.)
Cape Province.....	1,414,956	1,301,425	1,428,957
Natal.....	6,227	5,124	5,257
Transvaal.....	208,847	189,717	202,852
Orange Free State.....	617,502	350,715	308,752
UNION, TOTAL.....	2,247,532	1,846,981	1,945,818

RYE.

	Final Estimate, 1944-45. (bags, 200 lb.)	December Estimate, 1945-46. (bags, 200 lb.)	January Estimate, 1945-46. (bags 200 lb.)
Cape Province.....	268,395	251,041	218,458
Natal.....	756	497	558
Transvaal.....	722	938	1,491
Orange Free State.....	17,765	16,724	13,324
UNION, TOTAL.....	290,638	269,200	233,831

Index of Prices of Field Crops and Animal Products.

(Basic period 1936-37 to 1938-39=100.)

SEASON (1 July to 30 June).	Summer cereals.	Winter cereals.	Hay.	Other field crops.	Pastoral products.	Dairy products.	Slaughter stock.	Poultry and poultry products.	Com- bined index.
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	
WEIGHTS.	19	13	2	3	34	6	17	6	100
1938-39.....	92	107	96	89	79	102	106	92	93
1939-40.....	86	107	77	95	115	105	106	89	103
1940-41.....	109	113	106	156	102	108	110	104	108
1941-42.....	121	134	143	203	102	131	134	145	123
1942-43.....	160	149	144	159	122	147	167	173	146
1943-44.....	169	172	137	212	122	154	182	204	157
1944-45.....	184	183	160	230	122	177	172	187	163
1945—									
January.....	184	183	177	250	122	159	173	206	163
February.....	184	183	171	235	122	180	171	235	164
March.....	184	183	182	245	122	180	171	237	165
April.....	184	183	173	246	122	180	169	263	166
May.....	199	183	173	237	122	184	163	272	170
June.....	199	183	190	320	123	184	170	262	172
July.....	199	183	191	315	118	210	175	210	170
August.....	199	183	191	333	118	210	179	180	169
September.....	199	183	187	372	118	210	183	165	170
October.....	199	183	189	353	118	210	187	165	171
November.....	199	190	194	379	118	204	187	173	172
December.....	199	190	194	341	117	204	183	202	172
1946—									
January.....	199	190	191	349	118	204	179	233	174
February.....	199	190	158	308	118	186	175	256	171

(a) Maize and kaffircorn.

(b) Wheat, oats and rye.

(c) Lucerne and tef hay.

(d) Potatoes, sweet potatoes,
onions and dried beans.

(e) Wool, mohair, hides and skins.

(f) Butterfat, cheese milk and
condensing milk.

(g) Cattle, sheep and pigs.

(h) Fowls, turkeys and eggs.

Prices of Avocados and Papaws on Municipal Markets.

SEASON.	AVOCADOS (Per Tray). (a)				PAPAWS. (b)							
	Cape Town.	Durban.	Johannesburg.		Cape Town Std. Box.	Durban. Tray.	Johannesburg.		Port Eliza- beth Std. Box.	Bloem- fontein Std. Box.		
			Ordinary.	N.M.			Ordinary Std. Box.	N.M. Std. Box.				
1938-39.....	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1938-39.....	1 6	0 11	1 3	1 11	2 0	0 10	1 7	2 0	2 0	1 8		
1939-40.....	2 1	1 2	1 9	2 11	2 3	0 10	1 4	1 9	1 11	1 6		
1940-41.....	1 10	0 10	1 5	2 4	2 1	1 1	1 9	2 2	2 3	1 9		
1941-42.....	2 4	1 7	2 1	3 4	2 5	0 10	1 10	2 1	1 11	2 0		
1942-43.....	3 1	1 8	2 10	4 3	3 2	1 2	2 1	2 7	2 2	2 0		
1943-44.....	4 1	1 6	3 7	5 3	3 2	1 5	2 5	3 5	3 3	2 7		
1944-45.....	—	—	—	—	3 4	1 6	3 1	4 1	3 5	3 0		
1945—												
January.....	3 11	—	4 10	7 2	3 10	1 5	4 1	4 9	6 5	3 6		
February.....	2 0	2 3	2 6	4 3	2 8	1 10	5 11	7 6	—	5 5		
March.....	2 0	0 11	2 3	4 4	4 10	1 10	5 4	6 9	—	4 10		
April.....	1 10	0 10	2 7	3 11	4 9	1 8	4 5	6 2	4 11	4 8		
May.....	2 4	0 9	2 5	4 3	4 7	1 6	3 7	5 0	4 7	2 11		
June.....	2 4	2 5	2 10	6 1	4 4	1 11	3 7	4 6	4 0	3 6		
July.....	3 4	2 4	3 10	5 8	4 2	1 9	4 10	5 9	4 11	5 0		
August.....	6 8	3 10	6 2	7 4	5 10	1 5	4 10	6 1	5 3	5 0		
September.....	5 4	3 1	6 5	7 0	3 3	1 4	3 3	4 1	2 7	3 6		
October.....	7 2	3 8	8 1	7 4	2 7	1 5	2 5	3 5	2 2	2 4		
November.....	9 5	3 6	6 6	8 0	3 6	2 0	2 7	3 7	6 7	3 2		
December.....	7 8	1 0	7 1	—	4 4	1 0	3 11	5 7	5 10	3 6		
1946—												
January.....	8 1	1 8	5 10	9 2	3 10	1 6	4 5	7 11	6 4	3 11		
February.....	3 4	0 10	3 1	5 0	2 10	1 5	7 1	5 6	5 6	—		

(a) Season 1 January to 31 December.

(b) Season 1 April to 31 March

CROPS AND MARKETS.

Average Prices of Onions and Sweet Potatoes on Municipal Markets.

SEASON (1 July to 30 June).	ONIONS (120 lb.).						Sweet Potatoes. (120 lb.).		
	Johannesburg.		Cape Town.	Pretoria.	Durban.		Johan- burg. Table.	Durban.	Cape Town.
	Trans- vaal.	Cape.	Cape.	Cape.	Local.	Cape.			
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1938-39.....	8 3	8 10	7 4	7 10	8 6	9 6	5 7	4 8	5 3
1939-40.....	6 3	9 10	7 8	9 11	9 8	10 5	5 7	5 9	5 0
1940-41.....	12 5	12 8	9 10	11 11	11 2	12 7	7 3	6 4	5 5
1941-42.....	10 5	13 11	10 4	13 10	13 0	14 3	9 10	7 1	8 4
1942-43.....	13 8	14 0	12 6	14 7	12 9	14 5	9 8	8 1	8 5
1943-44.....	16 2	18 9	15 1	17 4	19 1	19 2	12 0	10 9	10 7
1944-45.....	14 7	18 7	14 8	18 1	18 8	19 5	17 3	15 1	16 3
1945—									
January.....	12 9	13 1	9 11	14 8	12 3	13 5	18 2	7 8	14 7
February.....	13 5	13 10	9 9	10 4	12 2	14 0	16 0	8 1	10 8
March.....	13 10	15 2	11 4	14 9	13 9	17 0	12 6	9 6	12 5
April.....	17 8	17 5	14 6	16 9	12 6	17 8	9 11	7 5	9 1
May.....	16 4	17 11	12 0	18 0	19 11	20 10	10 4	7 1	11 4
June.....	20 3	17 11	14 4	18 4	15 4	18 1	9 4	8 2	9 4
July.....	16 7	18 7	15 5	16 8	17 7	20 5	10 4	8 8	12 4
August.....	18 7	18 4	15 7	18 3	16 9	19 4	11 3	8 9	12 1
September.....	16 1	17 7	16 1	19 11	19 3	20 5	15 0	12 11	14 2
October.....	10 8	14 5	12 11	14 8	10 4	15 10	19 0	15 6	17 0
November.....	12 3	9 3	13 0	—	14 3	13 10	19 11	19 1	21 3
December.....	14 8	15 3	15 6	17 10	16 11	15 7	17 1	14 6	17 7
1946—									
January.....	12 0	12 1	9 7	—	11 7	13 0	17 1	15 6	17 3
February.....	12 3	13 8	11 1	13 1	15 2	9 11	17 3	10 3	17 2

Average Prices of Lucerne, Teff, Kaffircorn and Dry Beans.

SEASON AND MONTH (b).	LUCERNE (per 100 lb.).			Teff Johannesburg (a) 100 lb.	KAFFIRCORN in bags (200 lb.).		DRY BEANS (200 lb.) bags.		
	Johannesburg (a).		Cape Town 1st grade.		F.O.R. producers' stations.		Johannesburg (a).		
	Cape.	Trans- vaal.			K1. .	K2.	Speckled Sugar.	Cow- peas.	Kid- ney.
1938-39.....	s. d. 3 10	s. d. 3 1	s. d. 4 0	s. d. 2 7	s. d. 13 1	s. d. 12 9	s. d. 25 0	s. d. 16 9	s. d. 24 2
1939-40.....	3 0	2 5	3 4	2 6	8 8	9 4	21 11	13 11	21 2
1940-41.....	4 2	3 5	4 3	3 3	15 6	17 0	30 0	16 8	27 11
1941-42.....	5 7	5 2	5 8	4 7	18 10	19 6	32 10	19 8	28 3
1942-43.....	5 5	6 0	7 4	5 5	24 10	24 10	34 0	25 8	24 2
1943-44.....	5 4	5 6	7 3	4 5	21 0	21 7	49 6	29 11	32 1
1944-45.....	6 4	5 4	7 2	4 9	18 8	18 8	88 7	39 6	70 6
1945—									
January.....	7 3	5 7	7 3	4 1	23 1	23 1	118 8	45 11	98 2
February.....	7 0	6 9	7 6	—	22 0	22 0	122 3	45 3	95 3
March.....	7 2	5 10	7 3	5 5	22 0	22 0	107 9	42 11	89 3
April.....	6 10	—	7 8	5 2	22 0	22 0	109 11	58 4	104 3
May.....	6 9	5 7	7 6	5 5	20 6	20 6	111 1	61 7	97 1
June.....	7 6	6 9	7 9	5 8	20 6	20 6	102 2	67 11	95 2
July.....	7 6	—	7 9	5 9	20 6	20 6	105 8	67 1	80 10
August.....	7 6	—	7 9	5 9	20 6	20 6	93 7	66 3	80 7
September.....	7 4	—	7 9	5 9	20 6	20 6	87 0	67 2	74 8
October.....	7 5	7 6	7 0	5 9	20 6	20 6	91 2	70 8	68 3
November.....	7 6	6 9	7 3	6 6	20 6	20 6	106 3	68 7	79 1
December.....	7 6	—	7 3	—	20 6	20 6	104 3	61 7	69 6
1946—									
January.....	7 6	—	8 1	5 9	20 6	20 6	103 4	68 6	75 4
February.....	6 0	5 10	8 1	5 9	20 6	20 6	90 8	69 3	69 4

(a) Municipal Market.

(b) Seasonal year for kaffircorn,
1 June-31 May.

Dry Beans, 1 April-31 March;

Lucerne and teff, 1 July-30
June.

Average Prices of Green Beans, Green Peas and Carrots on Municipal Markets.

SEASON (1 July to 30 June.)	GREEN BEANS (Pocket 20 lb.).			GREEN PEAS (Pocket 20 lb.).			CARROTS (Bag). (a).		
	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.
1938-39.....	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1940-41.....	1 8	2 3	2 0	2 4	1 9	1 2	3 8	2 6	6 1
1941-42.....	1 11	2 9	1 5	2 8	2 4	2 3	5 9	4 11	13 4
1942-43.....	2 7	3 0	2 6	3 11	3 3	3 4	8 5	8 11	17 2
1943-44.....	3 1	4 3	3 0	3 8	2 10	3 9	5 1	8 9	13 2
1944-45.....	3 8	4 11	3 0	4 11	4 10	4 11	9 11	11 1	20 2
1945-.....	3 7	5 1	4 1	4 9	4 1	5 5	8 3	9 11	19 10
1946-.....									
January.....	1 10	0 11	2 4	4 3	1 9	6 7	7 7	3 1	10 2
February.....	1 7	3 4	2 3	5 5	6 9	7 4	7 8	6 11	19 1
March.....	2 3	4 11	2 6	7 7	12 0	6 7	9 5	6 3	25 4
April.....	1 11	2 8	1 10	4 4	6 6	4 0	8 6	13 9	19 6
May.....	3 3	5 3	2 3	5 9	9 11	3 1	9 5	8 7	21 6
June.....	4 3	4 2	5 0	4 9	7 9	3 8	10 0	10 10	13 9
July.....	9 10	7 10	5 10	8 2	11 7	8 8	10 1	16 4	20 11
August.....	7 4	6 4	6 10	5 3	7 10	5 5	13 4	17 11	12 11
September.....	3 1	5 9	4 1	2 8	4 1	2 4	7 5	12 8	16 8
October.....	3 8	5 4	4 9	4 4	3 6	7 7	9 6	9 10	20 11
November.....	1 6	2 4	2 4	9 0	4 0	9 4	9 8	8 8	16 4
December.....	2 4	2 3	2 8	12 1	—	12 5	10 9	7 10	13 10
1946-.....									
January.....	3 4	1 11	5 6	8 8	10 11	14 7	9 8	6 2	16 0
February.....	1 11	—	2 3	6 5	—	6 4	7 3	7 11	14 1

(a) Weights of bags vary, but on the average are approximately as follows:—Johannesburg, 130 lb.; Cape Town, 90 lb.; and Durban, 120 lb.

Average Prices of Cabbages, Cauliflower and Tomatoes on Municipal Markets.

SEASON (1 July to 30 June.)	CABBAGES (Bag). (a)			CAULIFLOWER (Bag). (a)			TOMATOES (Trays 15 lb.).			
	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.	Johannesburg.			
							N.M. No. 1.	Other.	Cape Town.	Durban.
1938-39.....	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1940-41.....	3 10	3 0	3 10	3 0	1 8	3 5	2 2	1 3	1 8	0 10
1941-42.....	5 10	4 8	7 1	3 11	4 3	5 3	2 7	1 6	2 1	1 2
1942-43.....	8 10	5 5	11 5	5 9	5 7	7 11	3 1	1 9	2 3	1 6
1943-44.....	5 6	5 11	9 1	5 0	5 9	7 6	3 4	1 10	2 1	2 7
1944-45.....	11 1	7 4	17 6	9 2	6 2	12 1	5 5	2 9	3 7	2 0
1945-.....	9 7	6 11	13 5	7 5	6 6	9 8	4 1	2 0	2 8	1 9
1946-.....										
January.....	8 0	4 9	15 8	6 3	—	—	6 1	2 6	2 7	2 2
February.....	7 8	8 6	22 4	9 5	6 11	—	3 0	1 2	3 1	1 1
March.....	8 5	10 5	24 1	8 8	—	8 0	3 4	1 5	2 5	2 4
April.....	8 7	7 11	14 8	7 7	9 7	11 4	3 4	1 5	2 6	1 7
May.....	7 6	5 4	11 2	7 3	6 5	10 10	4 0	1 10	2 4	1 10
June.....	8 11	4 8	10 6	11 7	7 7	14 10	3 11	2 1	3 0	1 1
July.....	12 2	5 4	11 0	12 3	5 7	11 0	3 7	1 10	2 9	1 2
August.....	12 0	9 7	8 11	10 0	8 2	12 3	5 2	3 2	3 4	1 5
September.....	12 2	11 7	10 8	11 8	9 6	14 10	6 7	3 1	3 10	1 10
October.....	10 1	12 1	16 3	17 0	5 9	11 0	6 2	2 8	3 1	1 8
November.....	10 9	9 11	16 0	12 9	8 6	—	5 7	2 8	4 0	1 6
December.....	14 2	9 10	17 7	26 0	3 6	—	3 0	1 1	3 11	1 1
1946-.....										
January.....	9 7	8 0	14 8	14 5	9 0	—	4 3	1 10	2 5	1 3
February.....	7 3	9 1	18 1	10 10	6 6	—	4 2	1 7	1 11	1 3

(a) Weights of bags vary, but on the average are approximately as follows: For cabbages—Johannesburg, 150 lb.; Cape Town, 105 lb.; and Durban, 90 lb. For cauliflower—Johannesburg, 100 lb.; Cape Town, 65 lb. and Durban, 85 lb.

CONTENTS

	PAGE
EDITORIAL:	
Judicious Food Production	287
Read and Succeed	288
FIELD HUSBANDRY:	
Cultivate more Wheat (H. J. Maree)	286
Soil Stability and Erosion (H. Klintworth)	305
Blossom-End Rot of Tomatoes (Dr. V. A. Wager)	309
Departmental Inspection and Certification of Seed Potatoes (L. J. Henning)	313
Dryland Wheat (F. X. Laubscher)	342
SPECIAL:	
Contribution of Agriculture to the Net National Income since 1940-41 (A. J. du Plessis)	289
FRUIT CULTURE:	
Fertilization of Grapes (A. H. Malan)	293
Green Rot in Apricots (A. J. Louw)	308
The Overhead Trellis (M. S. le Roux)	321
Red Scale on Citrus and its Control by Natural Factors (Dr. G. C. Ulyett)	333
ANIMAL HUSBANDRY:	
Minerals and Vitamins in the Nutrition of Pigs (Dr. J. H. Kellermann)	297
Value of Colostrum for Calves (J. C. Bonsma)	306
Wool Produced in the South-Eastern Orange Free State (J. C. de Klerk)	330
GENERAL:	
Farming is a Business: III. Sworn Friends of the Future (O. E. Burger)	320
Enzymes in Food (F. J. H. le Riche)	338
THE FARM HOME:	
Making Woollen Blankets (Miss S. Snyman)	345
CROPS AND MARKETS	349

[Photo on Cover: S.A.R. & H.]

[NOTE.—Articles from *Farming in South Africa* may be published
provided acknowledgment of source is given.]

FORD'S FOR SEEDS—A. FORD & Co. (Pty.) Ltd.

AGRICULTURAL SEEDSMEN.

SEED CONTRACTORS TO THE UNION GOVERNMENT,

P.O. BOX 5701.

CATALOGUES FREE

JOHANNESBURG.

Cultivate More Wheat.

H. J. Maree, Lecturer in Agronomy, Grootfontein College of Agriculture, Middeburg, Cape.

THE agricultural industry has been dislocated practically the world over and prospects for agricultural products are not yet satisfactory. In South Africa the position has been aggravated by a drought in the summer-rainfall area, which had a detrimental effect on the summer-crop yields, especially on the yield of maize which plays such an important rôle in our national economy. It is, therefore, desirable that vigorous attempts be made to put in more wheat with a view to increasing production this winter.

On account of the lateness of the rains in the greater part of the summer-rainfall area, some lands were not ploughed, while others were put to summer crops so late, especially in the case of maize, that the grain yield will be small.

Where facilities exist, late maize may be ensiled or else cut and stooked for carting off later. Although it may not be possible to bring all available lands under cultivation in this way, as many of these lands as possible should nevertheless be made available for the production of winter cereals.

Since wheat plays a more important rôle in human nutrition than any other winter cereal and may at the same time also be used in certain ways for the feeding of animals, more attention should be paid to the cultivation of this cereal. This does not imply that other winter cereals should be entirely replaced by wheat, but merely that it should be cultivated wherever possible.

Wheat provides good grazing—in fact at this Institution it was found that wheat yields better grazing than oats. If the wheat is not required for grazing at all or only partly, it may be kept for a grain crop. Under favourable conditions and especially where moisture is not lacking, the first grazing does not reduce the grain crop by more than about five per cent.

Under dryland conditions the soil should be ploughed deeply at an early stage. At sowing-time the lands may again be ploughed shallow, if necessary, or cultivated with a disc-plough and prepared for sowing. In the meantime weeds should be eradicated. The same procedure may be followed for lands under irrigation, especially if water is scarce.

For the Karroo areas, Red Egyptian, Scheepers (late varieties), Sterling and Pilgrim (early varieties) are recommended for a grain crop, and Kruger (early) for the coastal areas. Red Egyptian is a good yielder even when sown late and gives better results than early varieties. Although Scheepers has only been tried out for a few years, it has been found to give just as good results as Red Egyptian, provided it is not sown very late. Scheepers and Red Egyptian are most suitable for grazing purposes and also in cases where a possible grain crop after grazing is held in view.

The time for sowing in this area varies from February to August (excluding exceptional cases) according to the purpose for which wheat is sown.

In the Karroo, wheat is sown early if it is intended for grazing, but if a grain crop is the object it is usually not sown before the middle of May, when cultivated under irrigation, and even then there is the danger of damage by frost. Often a chance is taken in

FARMING IN SOUTH ... AFRICA

VOL. 21

MAY 1946

No. 242

Editorial:

Judicious Food Production.

THE WHOLE world is confronted to-day by one of the gravest and most difficult problems, viz. the world-wide famine conditions which are assuming more alarming proportions by the day. South Africa is no exception, since in this country too, the prevailing grain shortage has reached an exceedingly critical stage. Moreover, this state of affairs is expected to persist for some months to come and there is the possibility that it may become even more serious.

A food shortage is one of the numerous unhappy sequels to a world war, due as a rule to the increased consumption during and immediately after a war and the dislocation brought in its train. In so far as South Africa is concerned, this condition has assumed even graver proportions in consequence of the systematic decline in our agricultural production during the past three years brought about, *inter alia*, by drought, the army-worm and the deterioration in soil fertility. As against this, the prospects for importation of food from other countries are not too rosy. In view of the threatening state of emergency, it has therefore become imperative to make a strong appeal to our farmers to increase their production of agricultural crops, and in this connection, it is hoped that the fixed prices for the coming crops of wheat, maize, potatoes, etc., will act as an incentive to farmers for maximum production.

The public in general can also assist greatly by giving their fullest support to the State's efforts at effecting an equitable distribution of all available food supplies, *inter alia*, by careful and economical preparation of meals and the elimination of every conceivable form of wastage of food.

In their zealous efforts at increasing their production, farmers should, however, not make themselves guilty of malpractices such as overcropping but, should on the contrary, concentrate on sound, improved farming methods. It is for example, by no means necessary to plough soil, which by reason of its topographical situation and physical and chemical properties is unsuitable for cultivation. Farmers who fail to bring judiciousness to bear on their methods of cultivation have only themselves to blame for the large-scale soil depletion and erosion which are bound to occur even as they occurred after the previous world war.

The production capacity of most of the soils at present under cultivation can be appreciably enhanced by judicious fertilization, weed control, wider espacement in maize-planting and better soil cultivation with a view to the application of the general principles of soil conservation.

The present fertilizer scarcity has made it more essential than ever before that every possible effort be directed at effective utilization of kraal manure and at the conversion into compost of all refuse products on the farm.

Read and Succeed.

DURING the war not only the farming community, but also the city dwellers of South Africa exhibited an unprecedented interest in agricultural literature. The demand for the Department's agricultural bulletins eclipsed all previous records, due, no doubt, to the acute shortage of agricultural products. Even the number of subscribers to the monthly journal "Farming in South Africa" has increased by several thousand. Almost every household went in for the production of some product for home consumption or for the market, and always it was the Department to whom they looked for the necessary advice. It is most gratifying to find that the public recognizes in the Department the source from which the best advice on agricultural matters can be obtained. The enormous development in agricultural production is due mainly to the application of this advice. The soil and other instruments of production have always been the same and the secret of the success achieved must be sought in the application of the advice.

The paper shortage necessitated a considerable curtailment in the publication of bulletins, but now the accumulated information is rapidly pouring in, and soon literature on practically every branch of farming will once again be available in abundance.

The Annual Report of the Department was published recently and in it will be seen the difficulties with which agriculture had to contend during the war years and the directions in which it has developed. This report is published in the March 1946 issue of *Farming in South Africa*.

The Department is anxious that the lively interest displayed in literature on agricultural subjects in the course of the past few years, should be sustained, for only through close contact between the Department and the farming community can the agricultural industry be advanced. Only by reading more and reading regularly, can the public keep abreast of developments in agriculture.

The publications of the Department are issued for the sole purpose of furnishing the public with the necessary information, and if judiciously applied, this information, by bringing about increased and better production, will prove to the advantage not only of those who follow the Department's advice, but also of the country as a whole. Thus every progressive farmer should adopt as his slogan "Read and Succeed"

Contribution of Agriculture to the Net National Income of the Union since 1940-41.

A. J. du Plessis, Division of Economics and Markets.

IN the August 1943 issue of *Farming in South Africa*, a calculation was made of the annual gross value of agricultural production and the annual contribution of agriculture to the total net national income of the Union. These calculations extended over the years 1924-25 to 1938-39.

Although basic data are rather lacking at present, especially since no agricultural census (with the exception of a livestock census in 1943) has been taken since 1939, corresponding calculations were nevertheless made every year during the war and are dealt with in this article. These data are presented here in as cautious as possible an attempt to bring the series up to date, and although they have some value, a note of warning must be sounded against hasty conclusions. Especially as far as cash expenditure for farming purposes is concerned, it must be pointed out that by no means all cash costs have been included, but only those which are calculable and essential for ascertaining the net contribution of agriculture to the total national income.

The method of calculation is the same as the one previously followed. In the first place, the gross value of the agricultural production of all the races in the Union was calculated; this being indicated in column 1 of the table below for each of the years 1939-40 to 1944-45, together with the corresponding figures for previous years, which have already been published. This represents the *value of the products on the farm*, i.e., it is estimated on the basis of market prices, minus all marketing costs and railage. It includes the value of quantities marketed as well as of those consumed on farms and in native reserves. Quantities used for stock feed, however, e.g., all hay, the greater part of the oats, rye, barley and maize production, etc., were excluded to obviate double calculations, since the value of stock feed is already reflected in the value of animal products. Quantities retained for seed have also been excluded.

In the absence of agricultural census figures during the war years, the final crop-estimate figures of the Department have been used in those cases where such estimates are made. Further, data were obtained from the various control boards under the Marketing Act, the Office of Census and Statistics, the annual reports on Trade and Shipping and various other sources. In the case of vegetables, fruit and milk for drinking purposes, however, production has again been calculated according to the estimated consumption per capita of each of these products, as for pre-war years. This calculation also includes the agricultural production of Europeans and non-Europeans, as well as the value of such products as vegetables, fruit, eggs and milk, produced in urban and semi-urban areas.

Column 2 of the table gives the value of the annual cash expenditure (excluding interest on bonds, rent for land and cash spent on labour costs) incurred in production (see footnote to table).

In the previous article an estimate was made of all cash expenditure (excluding interest on bonds, land rent and cash spent on labour costs as well as certain incalculable costs) incurred

by producers for production purposes during the four years from 1936 to 1939. Since it was impossible, owing to the lack of the necessary information and data, to make such a complete estimate of the cash costs for each of the years since 1924-25, the annual cash costs were calculated by means of an index with the average annual cash expenditure figure as basis. The index was compiled from the value of the annual purchases of certain representative agricultural requirements like fertilizers, implements, bags, etc., in respect of which data are available annually.

The same method was adopted for estimating the value of the annual cash costs for the war years, although even for these few requirements the basic data were extremely limited in some cases and estimates of the value had to suffice. This applies especially to locally manufactured farming requirements, which increased considerably in quantity during the war.

In column 3 of the table the annual net agricultural income is given, i.e., the *annual contribution of agriculture to the total national income*. This was calculated by subtracting the total cash expenditure (excluding interest on bonds, rent of land and cash spent on labour costs) from the gross value of all agricultural products (excluding stock feed and seed), i.e., column 2 is subtracted from column 1.

In the fourth column of the table the total annual national income of the Union is indicated and in the last column the percentage of the national income constituted by the net agricultural income.

TABLE.—*Annual gross value of agricultural production (Forestry and Fisheries excluded); annual cash expenditure; net value from agricultural production and total annual national income of the Union of South Africa.*

Year.	A. Gross Value of Production.	B. Annual Cash Expenditure for Production Purposes.	C. Net Income from Agriculture.	D. Net National Income of the Union.	Percentage of Net Agri- cultural Income to Total for Union.
	(In thousands of pounds). £	(In thousands of pounds). £	(In thousands of pounds). £	(In thousands of pounds). £	
1924-25	58,785	14,439	44,346	227,000	19.4
1925-26	50,926	14,767	36,159	233,000	15.5
1926-27	56,190	14,111	42,079	247,000	17.0
1927-28	62,940	14,439	48,501	269,000	18.2
1928-29	59,712	17,721	41,991	264,000	15.9
1929-30	49,683	19,526	30,157	247,000	12.1
1930-31	40,663	12,798	27,865	232,000	12.1
1931-32	36,697	9,517	27,180	216,000	12.5
1932-33	35,588	6,399	29,189	235,000	12.3
1933-34	52,879	8,532	44,347	280,000	15.7
1934-35	48,312	12,789	35,514	294,000	12.2
1935-36	52,265	13,619	38,646	325,000	12.0
1936-37	61,662	14,767	46,895	366,000	12.8
1937-38	57,042	17,064	39,978	368,000	10.9
1938-39	63,327	16,572	46,755	391,000	12.0
1939-40	67,816	17,200	50,616	433,500	11.7
1940-41	71,925	18,200	53,725	477,100	11.3
1941-42	79,775	18,900	60,875	530,900	11.5
1942-43	97,922	15,000	82,922	565,600	14.7
1943-44	101,607	19,700	81,907	585,000	14.0
1944-45	99,292	—	—	—	—

A. The gross value of agriculture does not include that of forestry and fisheries.

B. The annual cash expenditure must by no means be regarded as the total expenditure for farming purposes. Apart from interest on bonds, rent of land and cash spent on labour costs, which are excluded, there are other items of expenditure which are incalculable and are therefore not included, viz. :—

(1) The purchase of second-hand implements and machinery, etc. Apart from the fact that the amount spent on these items is incalculable, it was also left out of account in the calculation of the national income, because the transactions were mainly concluded among the farmers themselves.

(2) Higher costs of maintenance of and repairs to old implements and machinery.

(3) Deterioration in soil fertility, depreciation of buildings, capital investment in permanent improvements, etc.

The annual cash expenditure, as shown above, was calculated from an index based on the average annual cash expenditure for the period 1936-39. The index was compiled from the value of the annual purchases of machinery and spare parts, fencing material, bags, wool packs, pockets, binder twine and twine, fertilizers, sprays, dips and packing material.

C. Calculated by subtracting the annual cash expenditure (column 2) from the annual gross value of agricultural production (column 1).

D. As calculated by Prof. S. H. Frankel of the Witwatersrand University and published in the third interim report of the Industrial and Agricultural Requirements Commission (1941), but amended according to the revised net income figures for agriculture. The calculations since 1939-40, however, are as published in "The South African Journal of Economics".

Gross value of Agricultural Production.

It appears from the above table that the gross value of agricultural production in 1943-44 was approximately £100 million, or about £40 million more than for the years immediately prior to the war. A preliminary calculation for 1944-45 reveals a slightly lower gross value of agricultural production than for 1943-44, viz., £99 million. On the other hand, the net national income was approximately £38 million more in 1943-44 than the average for the years 1936-37—38-39.

This, however, by no means implies that the farmers in the Union were better off by about £38 million in 1943-44 than they were before the war, since interest on bonds, rent for land and cash labour costs still had to be defrayed from the net income of approximately £82 million (column 3), in addition to certain incalculable expenditures as, for instance, purchases of second-hand machinery, implements, etc., in which an extensive trade was carried on at extremely high prices, chiefly because new articles were unobtainable. Furthermore, there was the rise in the cost of maintenance of and repairs to old implements, machinery, etc. Then there were factors such as soil deterioration, depreciation of buildings, permanent improvements, etc., as a result of the shortage of fertilizers and other instruments of production, the detrimental consequences of which will sooner or later have to be borne by the farmer.

Although concrete data are lacking, it is a known fact that cash costs in respect of wages to farm labourers as well as rent for land,

have risen considerably during the war. Granted that there was no rise in interest, and in some cases even a decline, land values nevertheless increased considerably, and in cases where land was bought at inflation values after 1940, the amount of interest on bonds accordingly increased considerably, especially having regard to the great increase in transfers of farm land since the war. *This amount of approximately £38 million, therefore, represents the increase in the contribution of the agricultural community (all races) as a whole to the national income of the Union in 1943-44 as compared with pre-war years.*

If the percentage contributed by agriculture to the total national income is considered, it becomes evident that the position of agriculture in relation to that of other branches of economic life has not improved much. Before the outbreak of the war the contribution of agriculture to the national income was only about 12 per cent. and according to these calculations there seems to have been a very small increase during the war. If, however, it is taken into consideration that considerably less capital was invested in the purchase of new farming implements, wire fencing, etc., than before the war, because supplies were unobtainable and that there was an increase in the cost of maintenance of and repairs to old implements, etc., it would appear that the pre-war proportion improved only slightly if at all. Cash costs for the purchasing of new machinery, implements, fertilizers, wire fencing, dips and sprays, etc., were considerably lower especially during 1942-43, compared with those of pre-war years. In 1942 local production of these farming requirements had not yet reached the high level it attained after 1943, while importation had considerably reduced. In addition, the physical volume of production has shown a decrease during the past three years, in spite of large-scale attempts at expansion. The decrease is attributable to the shortage of fertilizers, dips and sprays, to the poor quality of seed and also to the unfavourable climatic conditions which prevailed. The question of the volume of production will, however, be examined more fully in a later article.

It may be argued that fewer people were involved in the total agricultural production during the war years, since many were on military service or had left their farms for more remunerative fields of employment which were created elsewhere, as evidenced, *inter alia*, by the shortage of labour on farms. The net contribution per capita from agriculture may, therefore, have increased during the war. Data are still lacking, however, for any conclusive substantiation of this contention. On the other hand, we have the rise in the cost of living, which also affected the farming community and would immediately have neutralized any such increase in income per capita.

The fact remains, therefore, that even allowing for possible minor errors here and there (which are practically unavoidable, considering the lack of basic data) the above calculation clearly reveals that the position of agriculture is at present by no means reassuring, in spite of the considerably higher prices for most agricultural products during the war, and despite the expansion in production which took place. In fact any expansion or attempt at expansion of production, especially as far as crops are concerned, in most cases probably did not take place on an economic basis. This policy was, however, and continues to be justified in view of the food shortage with which the country has to contend.

Fertilization of Grapes.

A. H. Malan, Western Province Fruit Research Station,
Stellenbosch.

WITH the advent of the period of florescence, about 2½ months after the vines have started sprouting, the bunches reach the most critical stage of their development, since the quality as well as the average weight per bunch of the future crop largely depends upon the degree of fertilization which takes place during the flowering stage.

In view of the fact that the quality of the crop, i.e. the size and fullness of the bunches and the pre-thinning of seedless berries, play an important rôle in the economic production of grapes, satisfactorily fertilization is of supreme importance to the table-grape



A well-fertilized bunch of Hanepoot grapes.

farmer. A limited degree of non-setting may sometimes be advantageous, e.g. in varieties which set so well that the thinning out of green berries entails considerable expense.

If it were possible to assess in terms of money the losses annually suffered by table-grape farmers as a result of inadequate fertilization, the figure would undoubtedly be alarming.

With the exception of Barlinka, the most important commercial table-grape varieties, such as Waltham Cross, Alphonse Lavallée and Hanepoot are, on the whole, subject to poor or imperfect fertilization. Non-setting is particularly marked in Hanepoot, and the formation of seedless, round berries very common in Barlinka.

Possible Causes.

Poor fertilization may be due to one or more of the following causes:—

(1) An excess of nitrogen in the soil. This tends to induce vigorous vine growth at the expense of bearing capacity and quality. The abundance of shoots and the dense foliage exclude too much warmth and air and constitute a further cause of poor fertilization.

(2) An excess of nitrogen in relation to phosphate in the soil.

(3) Wrong p.H. value of the soil, which may be too acid, with resultant precipitation of available phosphates in the form of inassimilable iron and aluminium phosphate. The plant may therefore suffer from a phosphate deficiency.

In this connection it should be borne in mind that regular applications of fair amounts of sulphur, although essential to the control of oidium and anthracnose, increase the degree of acidity of the soil.

(4) Unsuitable sites, e.g. cold, damp, poorly-drained vleis.

(5) Unsuitable soil type for the specific variety.

(6) Wrong rootstock for the variety and soil type.

(7) Deficiency of trace elements, e.g. boron, zinc, manganese, magnesium, etc.

(8) Poor selection of scions.

(9) Incorrect cultivation methods, e.g. in pruning, topping, trellising, etc.

(10) Inadequate provision for cross pollination.

(11) Unfavourable weather conditions before and during the period of florescence.

(12) Hereditary defects.

Practical Expedients.

Up to the present efforts at finding a satisfactory general solution to this cardinal problem have been frustrated by a large diversity of factors which conduce to inadequate fertilization, by factors beyond human control, such as climatic conditions, especially during the period of florescence, and by inherent-hereditary defects in existing vineyards.

Nevertheless, we have sufficient knowledge at our disposal to be able to effect a considerable improvement in the fertilization process, provided that this knowledge is judiciously applied, with due regard to the specific circumstances.

The following practical suggestions are offered for improving grape fertilization:—

(1) Stable manure or nitrogenous fertilizers should be withheld from excessively luxuriant vineyards until such time as the profuse growth has been inhibited, for such vineyards have a low bearing capacity and are subject to poor fertilization. Should there not be

sufficient grass for organic fertilization, a cereal crop such as barley may be sown in order to maintain the humus content. Lupines and peas are undesirable in such cases, since being legumes, they will increase the nitrogen content of the soil. A liberal annual application of phosphates (at least 600 lb. superphosphate per morgen) is required in such vineyards.

2. Luxuriant vines should be pruned late. The clearing (preliminary pruning) and cutting back (final pruning) of bearers may be carried out simultaneously from the second week in August. Bleeding will take place during the pruning process, and consequently the vigour will be inhibited and the bearing capacity and fertilization promoted. Moreover, such vines will start sprouting and flowering at a later stage when climatic conditions are likely to be more favourable for satisfactory fertilization.

3. Long bearers with from 8 to 10 buds should be pruned with the necessary short bearers. This practice will make better selection possible in the pre-thinning of bunches. As far as possible, shoots of medium thickness should be used for the long and short bearers. Short spurs on the long bearers will increase the crop. Hanepoot and Alphonse Lavallée usually bear sufficient berries on the short bearers.

4. Twisting the long bearers around the trellis wire will inhibit vigour and promote fertilization. This practice should, however, not be overdone.

5. Non-bearing and superfluous water shoots should be judiciously removed before the florescence stage is reached. This makes for warmer and drier conditions around the bunch during the period of florescence. Where vines are tipped or very lightly topped, the judicious removal of leaves is advisable in cases where, due to the dense foliage, the bunches do not receive sufficient light, warmth and air, all of which are important factors in effective fertilization.

In this connection, the fact may be stressed that haphazard winding or lacing of shoots around the wire regardless of whether the young bunches are cramped, is strongly to be deprecated. If it is not possible to fasten the shoots, winegrowers should at least see to it that the young bunches do not become entangled in the shoots and leaves, but hang as freely as possible.

6. An improved system of trellising should be adopted, such as the slanting trellis or the overhead trellis, where for the most part, the bunches hang freely.

7. Topping or tipping should be carried out for the first time at the beginning of the period of florescence. Where danger of wind damage exists, the shoots should be fastened in good time. All green tips should then be removed simultaneously. This is particularly important in varieties which are inclined to set badly, for if the growth of longer shoots only is inhibited during the period of florescence, the sap is simply absorbed by the shorter, untopped shoots, and but little sap reaches the bunches. The process therefore largely defeats its own ends. The greater the quantity of material removed in topping, the firmer will the bunches set, and a stage may ultimately be reached where the bunches will not only be too compact, but where further topping, by limiting the leaf surface, would involve the danger of poor colouring and a low sugar content.

8. The tips of the bunches as well as those of the lateral shoots should be broken off immediately before or at the very beginning of the period of florescence.

9. During cold and calm weather the bud sometimes has difficulty in shedding the corolla, in consequence of which fertilization is hampered. Occasional shaking of the vine during flowering time will assist this process and promote pollination.

10. If necessary, the vines should be given a thorough irrigation about a week before the commencement of florescence. It is important that the vine should not be dry during this critical period. The vines should not be irrigated during the period of florescence, since cold and moisture are detrimental to fertilization. It should be mentioned in this connection that a good irrigation shortly after the grapes have been harvested often promotes the maturing of the wood and will therefore have a salutary effect on the quality of the future crop.

11. So-called male stocks which repeatedly yield no crop or else set extremely badly must be re-grafted at the earliest possible opportunity.

12. The vines should be kept free from disease, especially from anthracnose.

While the most scrupulous and painstaking endeavours to promote effective fertilization may sometimes be unavailing under unfavourable climatic conditions beyond human control, the careful and judicious application of the above expedients will nevertheless improve fertilization to some extent and will in the long run undoubtedly be to the advantage of wine-growers.

Cultivate more Wheat :—

[Continued from page 286.]

the hope that frost will not recur, with the result that the wheat reaches the piping stage too early and is sometimes killed or badly damaged by frost later. It is better to allow the wheat to be grazed than to let it reach the piping stage too soon.

Since wheat seed is scarce this year and some varieties are already unobtainable, it is important to pay attention to the rate of seeding. Wheat is usually sown too densely, which is nothing more than a waste of seed. At this Institution wheat cultivated under irrigation and intended for grain was sown according to two rates of seeding, viz., 80 and 120 lb. per morgen, and there was no significant difference between the yields. By sowing less densely the area which is sown to wheat, may be considerably increased, with a resultant increase in the yield. Wheat should not be sown too densely, especially under dryland conditions.

Irrigation.

Although no definite rules can be laid down in connection with the irrigation of wheat, since it is influenced by factors like the date of planting, variety of wheat, type of soil, amount of rain before and during the growing season, etc., certain observations may serve as a guide.

Wheat cannot utilize heavy irrigations, 3 to 4 inches at a time being sufficient. Heavy irrigations leach out the plant food and damage the structure of the soil. It is, therefore, wrong to irrigate too often and too heavily. Wheat should be irrigated only when the plants begin to suffer. The critical period is from the time when the plants begin to stool till the flowering stage. During this period the plants should not be allowed to suffer from drought. The total amount of irrigation during the growing season, including the rainfall, is usually about 20 inches.

Minerals and Vitamins in the Nutrition of Pigs.

Dr. J. H. Kellermann, Department of Biochemistry, Agricultural Research Institute, Pretoria.

CERTAIN minerals and vitamins are absolutely essential in the nutrition of pigs. When these food constituents are present in adequate amounts in the ration, the animals are usually thrifty and healthy, and manifest normal growth and reproduction. When one or more of these essential factors are lacking, the animals will become unthrifty, their growth will be impaired, and sooner or later pathological symptoms will appear. These symptoms may be mild in the beginning and sometimes take long to develop, but if the ration is not supplemented with the lacking constituent, death will ultimately result.

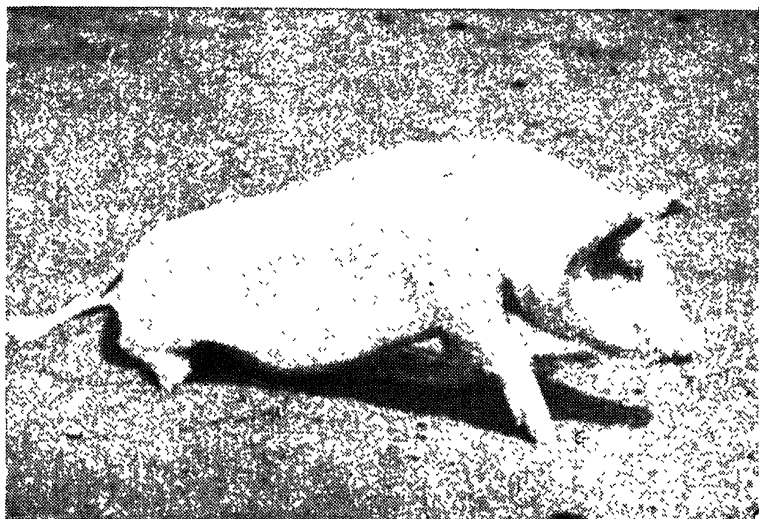


Fig. 1.—Pig 41 (male). Paralysis of hindquarters as the result of a fractured vertebral column which happened 67 days after commencing to feed animal on a calcium deficient ration.

Under intensive systems of farming in South Africa, the food of the pig consists principally of cereals and industrial by-products such as bran, pollard, linseed-oil meal, fish and meat meals.

In localities where pig farming is carried on in conjunction with butter or cheese making, separated milk, buttermilk or whey is also utilized. These products are, from a pig feeding point of view, deficient in one or more of the essential minerals and vitamins. Hence, due to ignorance on the part of some farmers, nutritional deficiencies sometimes occur amongst their pigs, resulting in severe financial losses.

The Mineral Elements.

The mineral elements most likely to be deficient in the ration of pigs in South Africa are calcium, sodium and chlorine. At the

same time, the rôle played by phosphorus, iron and iodine in the successful raising of pigs should not be overlooked.

Calcium and Phosphorus.

In view of the fact that the functions of calcium and phosphorus are so closely related in the body, they are conveniently discussed together. Although these two elements are present in almost all tissues of the body, they serve mostly in the formation of the skeleton, where they occur in the ratio of two parts of calcium to one part of phosphorus. As stated previously, the rations of pigs

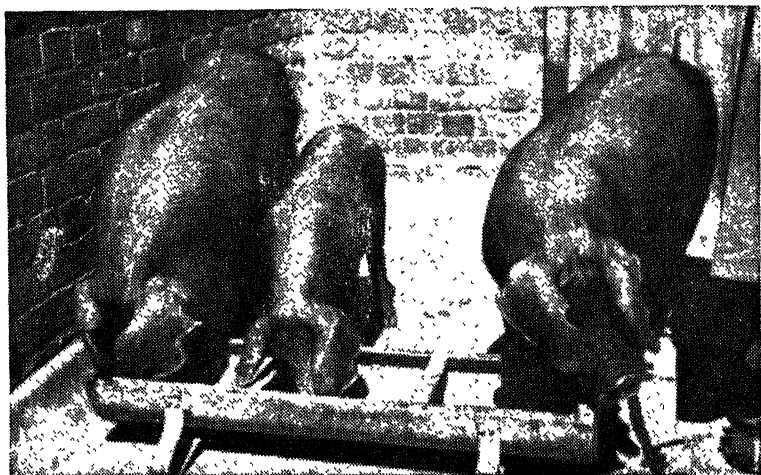


FIG. 2.—Three male litter mates after 129 days on experiment. Pig in centre received a vitamin A-deficient ration; pig on right received vitamin A in the form of yellow maize and one on left received vitamin A in the form of lucerne meal.

are composed mainly of cereals together with plant and animal proteins. These products are poor sources of calcium but, on the other hand, they are rich in phosphorus. Therefore, a deficiency of phosphorus in the ration is unlikely to occur, but there is danger of a calcium shortage.

When growing pigs are fed a ration deficient in calcium, growth is below normal. If the deficiency is serious, the animals will in a comparatively short period cease to gain any further weight. Associated with the lack of growth are usually other characteristics such as a rough coat, a scaly skin, decreased and depraved appetite, crampiness, and brittleness of the bones which may become soft and easily fracture (Fig. 1*). As large amounts of calcium are needed for normal reproduction and milk secretion, the pregnant and lactating sow is more seriously affected by a shortage of calcium in the ration. Difficulty is experienced with farrowing and the young are underdeveloped and weak. Milk secretion is impaired and deaths among the young are high.

The various disorders resulting from a calcium deficiency may be prevented by feeding pigs calcium-rich foods such as lucerne or other leguminous plants, by giving the animals free access to pasture,

* The pictures given in this article are taken from the publication of Kellermann, Schulz and Thomas, the bibliographical details of which are given under the references.

or by incorporating calcium salts in the concentrate mixture. Since cereal and protein mixtures contain adequate amounts of phosphorus, it would seem that the carbonate is the best form in which to add the calcium. In practice, however, equally good results are obtained by the use of sterilized bone meal or calcium phosphate. The use of rock phosphate, which frequently contains fluorine, is not recommended owing to its fluorine content which is injurious to pigs.

Sodium and Chlorine.

These two elements are discussed together because the use of sodium chloride (NaCl.) or common salt is the most convenient and practical way of supplying both. Sodium chloride not only increases the palatability of food, but also plays an important rôle in blood plasma and in the physiology of body cells. The main symptoms of a salt deficiency in the ration are an unthrifty appearance, slow growth and loss of appetite. Rations composed of cereal grains and their by-products, supplemented with vegetable proteins (oil cakes or meals) or meat meal, do not contain sufficient sodium chloride. The addition of common salt to such rations results in a marked improvement in rate of growth and in the efficiency of food utilization. Milk, when consumed in sufficient quantity, will supply the sodium chloride requirements of the pig. Fish meal is also a good source of sodium chloride. Where these foods are not fed in considerable quantities, sodium chloride must be added to the ration.

Iodine.

This element is essential for the synthesis of a certain hormone, called thyroxin, in the thyroid gland. This hormone regulates the



FIG. 3.—Fig 53 (female). Animal made poor growth and appeared thin and leggy after 129 days on a vitamin A-deficient ration

metabolism of the body, and hence the food should supply a continuous amount of iodine.

In certain parts of the world, notably in some central areas of North America and in Switzerland, the soil and the crops grown thereon are deficient in iodine. Animals fed on foodstuffs grown in these parts develop diseased conditions. Brood sows fed a ration

deficient in iodine during pregnancy give birth to young which frequently are dead or very weak, hairless and in a goitrous condition. The addition of potassium iodide to the iodine-deficient ration of the pregnant sow enables her to give birth to normal young. As far as is known, there is no deficiency of iodine in the foodstuffs grown in South Africa. It has been experimentally established that the addition of iodine to the food of stock in this country is not accompanied by any beneficial effects.

Iron and Copper.

These elements are required for the synthesis of haemoglobin in red blood cells. Iron, but not copper, forms an integral part of the haemoglobin molecule; yet for the synthesis of haemoglobin the presence of copper in the food is essential. When these elements are lacking in the food of pigs, the haemoglobin level of the blood will drop and nutritional anaemia will eventually develop.

An ordinary cereal ration contains considerable quantities of iron and copper. There is, therefore, no danger of a shortage of these elements once young pigs begin to eat solid food. Mother's milk, however, is a very poor source of iron and copper. If suckling pigs are kept indoors on concrete floors, fatalities due to anaemia may occur at ages ranging from three to six weeks. The main symptoms of this condition are a rather pale colour and slight puffiness of the skin, laboured breathing on slight exertion (thumps) and sudden death. The most practical way of preventing anaemia is to allow the sow and her litter out on pasture, where sufficient

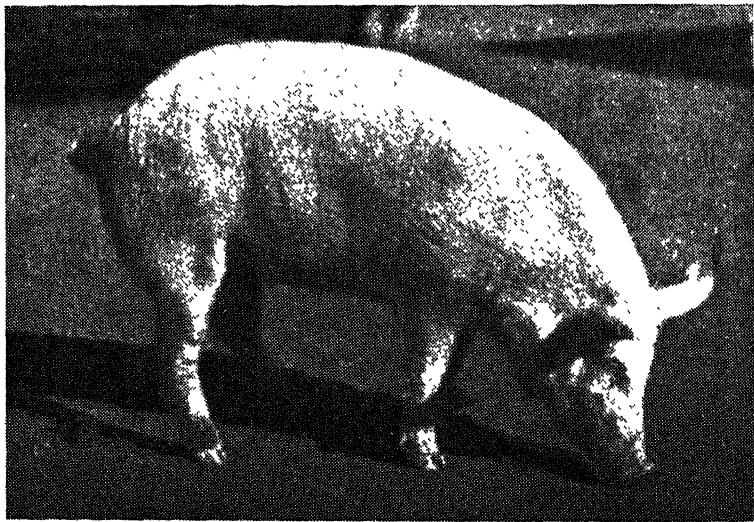


FIG. 4.—Pig 53 (female) after receiving 25 ml. cod-liver oil daily for 121 days.

of the necessary elements can be obtained by the suckling pigs either from the soil or the green herbage.

The Vitamins.

The vitamins required by the pig can be divided into two groups, viz., the fat-soluble and the water-soluble ones. Among the first group are the following:—

Vitamin A.—Of all the vitamins this essential food factor is

the one most likely to be deficient in the food of pigs under South African conditions. As a matter of fact, it was found at Onderstepoort that posterior paralysis, a condition often occurring in swine in this country, is not infrequently caused by a low vitamin A intake. With the exception of yellow maize, all cereals, mill by-products, cakes and meals from the oil-extraction industry, and certain by-

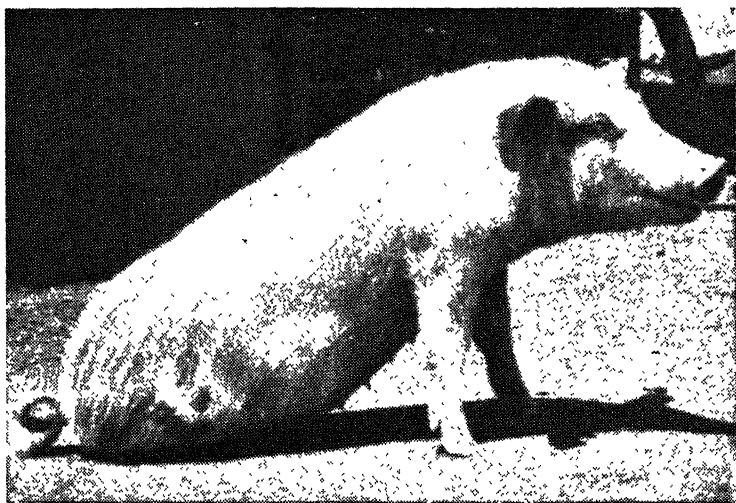


FIG. 5.—Fig 42 (female). Paralysis of hindquarters after 129 days on a vitamin A-deficient ration.

products of fish-curing and slaughter-house establishments, separated milk and whey are poor sources of vitamin A. On the other hand, green pasture, lucerne meal, pumpkins and yellow maize contain considerable amounts of this factor.

A vitamin A deficiency is generally experienced towards the end of long dry seasons, which usually extend from October to March in the winter-rainfall areas and from March to October or even later in the summer-rainfall areas. Little or no green food is available on most farms during these periods, which last from six to seven months.

Notwithstanding the fact that considerable amounts of vitamin A are stored in the liver of animals during periods of excess vitamin A intake, it is evident from experimental results that the dry seasons, accompanied by a low vitamin A intake, are long enough to manifest their deleterious effects, particularly in the young of such a fast-growing species as the pig.

The main successive clinical symptoms of vitamin A deficiency may be summarized as follows. The first signs are a falling off of the appetite with consequent retardation of growth, unthriftiness and dull and shaggy hair. In addition, the skin is dry and scaly. The eyes appear watery, and day and night blindness is evident. The limbs are straight and stiff or stilted, and accompanied by a short-stepped gait, inco-ordination of movements and paralysis of the hindquarters. This is due to degeneration of the nervous system. The animal can only raise its body with its fore limbs to

assume a sitting posture. Ultimately there is a nervous collapse in most animals, accompanied by convulsive fits which can easily be brought about by exciting the animal (Figs. 2 to 8).

Gilts exhibit oestrus at irregular intervals and may remain on heat for unusually long periods.

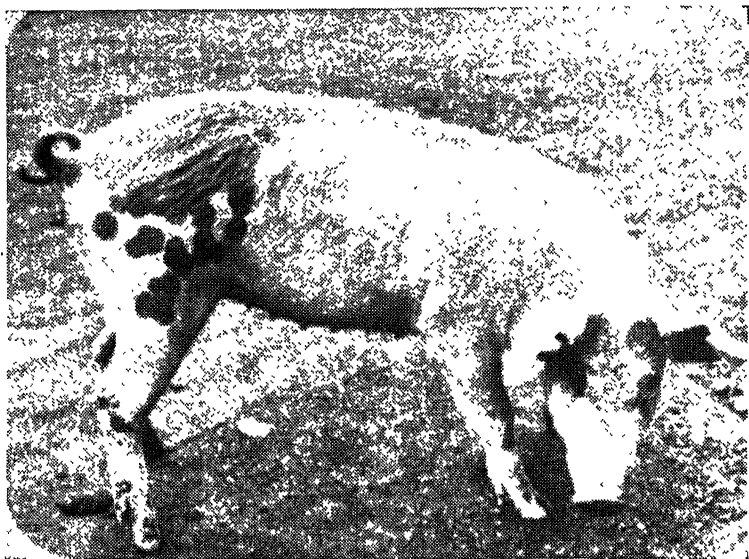


FIG. 6.— Pig 42 (female). Animal able to stand again after receiving 100 ml. cod-liver oil daily for 10 days.

A lack of vitamin A intake can be prevented by feeding green feed, pumpkins, yellow maize, etc., or by adding about 10 per cent. of lucerne meal to the concentrates. When green feed or lucerne meal is not available, the feeding of cod-liver oil, which is an excellent source of vitamin A, will serve the same purpose. In that case about a half of one per cent. of oil should be added to the ration.

Vitamin D.—This factor is essential for the normal calcification of bones. It occurs abundantly in certain fish oils such as, for instance, cod-liver oil. Fortunately, the intake of vitamin D is of no practical importance in livestock feeding in this country, in view of the fact that the ultra-violet rays in sunlight are capable of converting a certain sterol (7 dehydrocholesterol) in the skin of man and animals into vitamin D.

The water-soluble factors required by the pig all belong to the so-called vitamin B complex. They are:—

Thiamine or vitamin B₁.—Cereals and mill by-products, the major ingredients of pig rations, are very rich in thiamine. Hence pigs are not likely to suffer from a deficiency of this factor under the usual methods of feeding. In laboratory experiments it was found that a lack of thiamine in the ration causes loss of appetite and weight, retards growth, is responsible for weakness of the legs, and disturbs the nervous system as well as the gastro-intestinal tract of the animal.

Riboflavin.—Cereals are poor sources of riboflavin. Milk, meat, and fish products, green actively growing leaves, high quality lucerne meal and green pastures are important sources, and hence it is unlikely that pigs will suffer from a shortage of this vitamin under ordinary conditions.

Nicotinic acid (niacin).—A condition known as “pig pellagra” develops in young pigs placed under laboratory conditions on a ration which is purified and free of nicotinic acid. This disease is characterized by diarrhoea, anaemia, dermatitis, nervous disorders, loss of appetite and consequent loss of weight.

If nicotinic acid is not added to the food the animal will ultimately die. Upon autopsy the intestinal tracts of such animals show various pathological changes such as haemorrhagic lesions in the mucous membrane of the stomach and duodenum, congestion and swelling of the mucous lining of the small intestine, and ulcers of the large intestine. Animals in advanced stages can be cured by the administration of nicotinic acid.

Pantothenic acid.—Young pigs fed a ration deficient in pantothenic acid develop the following symptoms:— subnormal appetite, slow growth, emaciation, lack of normal co-ordination and “goose-stepping”.

Bran and meat meal are known to contain fair amounts of niacin (nicotinic acid) and pantothenic acid, and consequently it is doubtful whether it is necessary to supplement the commonly used pig rations with these two dietary factors.

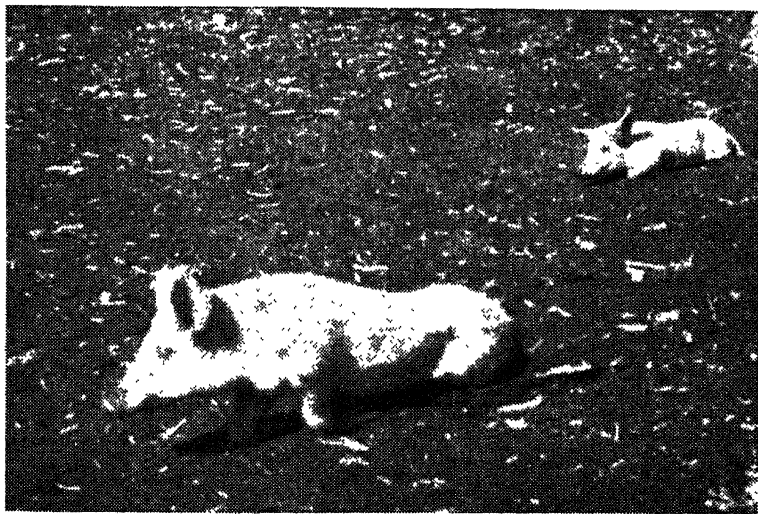


FIG. 7.—Natural cases of vitamin A deficiency. Animals paralyzed, dragging hindquarters.

Practical Conclusions.

1. The food of the pig consists principally of cereals and their by-products, meals of oil-extracted seeds and certain by-products of fish-curing and slaughter-house establishments. With the exception of yellow maize which is a good source of vitamin A, and fish meal which contains appreciable amounts of sodium chloride, these food products are poor sources of calcium, sodium, chlorine and vitamin A.

2. Green pasture, e.g. green lucerne, is an excellent source of both calcium and vitamin A. Consequently, the grain-protein mixtures fed to pigs on pasture need only be supplemented with about 0.5 per cent. of sodium chloride (common salt).

3. The grain-protein concentrates fed to pigs in dry lot must be supplemented with calcium and vitamin A in addition to sodium chloride. The most economical and practical way of adding vitamin A to the ration is in the form of lucerne meal and/or yellow maize meal. About 10 per cent. of lucerne meal or about 50 per cent. of yellow maize will supply the vitamin A requirements of pigs for normal growth. In view of the fact that the demand for vitamin



FIG. B.—Natural cases of vitamin A deficiency. Typical posture when at rest.

A by pregnant and lactating sows is so high, the ration of these animals should contain both yellow maize and lucerne meal. The addition of either 1.5 per cent. of fluorine-low agricultural lime or 2 per cent. of sterilized bone meal to the concentrates, will supply the calcium requirements for normal growth and reproduction.

REFERENCES.

- BLOM, I. J. B. (1934). Studies in Mineral Metabolism XXIX. The iodine content of foodstuffs in relation to the occurrence of endemic goitre in the Langkloof Valley. *Onderstepoort Journ. Vet. Sci. and Anim. Indust.* Vol. 2, pp. 131-138.
- FAIRBANKS, B. W., AND KRIDER, J. L. (1945). Significance of the B-Vitamins in Swine Nutrition. *The North American Veterinarian*, Vol. 26, pp. 18-23.
- HUGHES, E. H., AND OTHERS (1944). Recommended nutrient allowances for swine. *Bull. No. 2 of the Nat. Res. Council on Recommended Nutrient Allowances for Domestic Animals*.
- KELLERMANN, J. H., SCHULZ, K. O. A., AND THOMAS, A. D. (1943). Paresis in pigs in relation to nutritional deficiencies. *Onderstepoort Journ. Vet. Sci. and Anim. Indust.* Vol. 18, pp. 225-262.
- MALAN, A. I., DU TOIT, P. J., AND GROENEWALD, J. W. (1940). Iodine in the nutrition of sheep. Final Report. *Onderstepoort Journ. Vet. Sci. and Anim. Indust.* Vol. 14, pp. 329-334.
- SHERBY, E. J. (1932). Minerals and Vitamins in pig-feeding. *Nutrition Abstracts and Reviews* Vol. 2, pp. 221-228.

Soil Stability and Erosion.

H. Klintworth, Division of Chemical Services.

THE erosive action of water on a soil may be said to consist of two distinct and separate processes. Firstly, there is a dispersion of the soil into particles, some of which are fine enough to be moved by running water, and, secondly, the transportation of these particles to the lower slopes and away to rivers. The first process is not very conspicuous, most attention being given to the second process because its final results are so spectacular. Yet there can be no doubt that the original cause of the big dongas or of the sheet erosion which may cover so many acres, lies in the inconspicuous fact that the rain breaks down the surface soil into particles which can be carried away by wind or water. If the soil structure were to remain absolutely stable under the impact of rain and the flow of surface water, no erosion could be possible.

The maintenance of a good and stable soil structure has become one of the chief objects of all soil-conservation farming practices. It has been realized, for instance, that continuous clean cultivation of a land under annual cash crops inevitably causes a progressive deterioration of the soil structure. As an example of this the data obtained from an investigation of a number of soils from the Transkei may be given.

It was found that soils taken from lands which had been cultivated for many years, dispersed readily when treated with water. On the average, 40 per cent. of the soil broke down into particles which were smaller than 0.15 millimetres. When virgin soils were treated in exactly the same way, only ten per cent. disintegrated into particles of that size.

It must not be inferred from these figures that the cultivated soil is only four times as erodible as the virgin soil. Actually, the ratio is a good deal worse than that, because other factors come into play as a direct result of the unstable nature of the soil. Thus, when rain falls on the cultivated soil, the clods on the surface break down and become puddled. The dispersed particles tend to be washed down into the deeper soil, but they also block up the pores, with the result that the water cannot penetrate but runs off and this causes erosion. Under the same conditions the virgin soil does not break down to the same extent and the water can penetrate freely. In America it has been determined that under certain conditions there may be up to ten times more run-off from cultivated lands than from soil under a dense pasture, causing 50 to 100 times as much erosion damage.

In all cultivated lands it is therefore of the utmost importance to maintain a good and water-stable soil structure. Contour cultivation, contour banks and furrows, terraces, and so on, are all excellent engineering practices of great value. Their object is, however, an engineering one only, namely, the disposal of rain-water in small and slow-moving streams which cannot cause dangerous erosion. In other words, their object is the prevention of the second stage of soil-erosion mentioned above, that is, the transportation of the soil particles which have broken loose from the larger soil clods and aggregates. Granted that it may be possible to do this by mechanical means and thus completely to prevent erosion by water, it must also be admitted that the destruction of the soil structure cannot be stopped in this way. The efficiency of the engineering methods may thus tend to encourage the continuation of the same

Value of Colostrum for Calves.

J. C. Bonsma, Professional Officer, Department
of Agriculture.

THE first milk produced by an animal after the birth of her young is known as beestings or colostrum. Colostrum is produced only during the first three or four days after the birth of the young animal.

Composition of Colostrum.

The composition of colostrum differs considerably from that of ordinary milk. It contains 6 to 8 times more proteins than ordinary milk and is also very rich in anti-bodies, i.e. ingredients in the fluids of the body which counteract and even destroy disease germs. Colostrum contains 2 to 3 times as many anti-bodies as even the blood serum of the same animal species.

The concentration of anti-bodies in the colostrum decreases very rapidly a few hours after the young animal has had its first drink.

Young animals which have not had colostrum are usually very susceptible to disease and generally die at an early age.

The results of feeding experiments at the Missouri University in the U.S.A. show that 32 per cent. of the calves which did not receive colostrum, died within the first few weeks.

Functions of Colostrum.

The vitamin A content of the liver of new-born animals which have not yet taken colostrum is usually very low. As soon as the young animal takes colostrum this condition disappears and the vitamin A content of the liver becomes normal.

Colostrum contains 10 to 100 times as much vitamin A as ordinary milk. Vitamin A is one of the essential vitamins for growth in calves and for the development of their eyes.

Colostrum is probably also rich in the other fat-soluble vitamins, viz. E and K, which are important for the development of muscle tissues and coagulation of the blood, but the presence and proportion of these vitamins have not definitely been determined as yet.

Colostrum probably also plays an important part in the discharge of meconium and later in the normal functioning of the digestive system. In experiments where calves did not receive colostrum, it was found that the discharge of meconium (i.e. the excreta found in the intestines of the unborn animal) did take place, but that later evacuation of the bowels was delayed.

During the first two or three days, the urine of new-born calves has a high albumen content, probably to provide for the normal functioning of the kidneys, and to protect them against infection.

Colostrum is also rich in minerals and initially has a high calcium, magnesium, sodium, phosphorus and chlorine content which drops within a few days until the normal level for milk is reached.

From this discussion it is clear that colostrum plays an important part in the feeding of young animals. Its composition in the udder of a cow with a new-born calf is such that it meets the requirements of the young animal completely and perfectly.

No Effective Substitute.

Up to the present all attempts at manufacturing an effective substitute for colostrum have been unsuccessful. One of the most important functions of colostrum, viz. to provide anti-bodies which

make the animal resistant to bacterial infection, can be carried out fairly effectively by supplementing the first feeding of whole milk given to the young animal with $\frac{1}{4}$ to $\frac{1}{2}$ pint (5-7 oz.) of blood serum of the same animal species. (Blood serum is the straw-coloured fluid which settles at the bottom in coagulated blood.)

The protein content of whole milk can also be supplemented by beating the white of six eggs into the first milk feed and using one egg less at every subsequent feed until the calf is fed on whole milk only.

It is essential, therefore, that a normal calf, born normally, should stay with its mother for about 48 hours.

(J. C. Bonsma, Professional Officer, Department of Agriculture and Forestry.)

Soil Stability and Erosion:—

[Continued from page 305.]

farming practices which caused the break-down of the soil structure and erosion in the first place.

In addition to the mechanical measures, therefore, it is necessary to introduce also such agricultural practices as will build up the soil structure and increase the stability of the soil aggregates. The surface soil must be transformed into a spongy and porous condition so that it will absorb the rain-water easily and effectively and be a proper medium for plant growth.

It has been thought that the incorporation of organic manures would be sufficient to bring about the desired improvement. The benefits obtained are, however, of a very temporary nature. A lasting improvement is possible only by putting the land under grass for at least two years. The incorporation of grass leys in our systems of rotational cropping is one of the surest means of effecting soil stability and counteracting erosion.

A Genetic Study of Sorghum Relationships.

THIS science bulletin, No. 242, by F. X. Laubscher of the Potchefstroom College of Agriculture, is a study of the inheritance of various sorghum characters which give an indication of the degree of relationship between the respective parents. The data obtained in this manner are interpreted in the light of current opinions on the botanical relationship between different groups of this genus. The bulletin is obtainable from the above-mentioned Institution at 3d. per copy.

Green Rot in Apricots.

A. J. Louw, Plant Pathologist, Fruit Research Station,
Stellenbosch.

DURING October of last year general complaints were received from the south-western districts of the Cape Province about widespread damage which had been caused by a "foreign" disease in green apricots. This damage consists in the decaying of the small green apricot, usually starting from the calyx end where the old sepals of the blossom adhere to the fruit. A white mould then gradually develops on the surface of the fruit which later shrivels up and becomes gummed to the twig if it does not drop off prematurely.

This disease, which is known as "green rot" in apricots, is caused by a fungus, and has been known for many years in the western Cape Province. It generally occurs sporadically, however, and for a number of years has not caused any serious losses in the winter-rainfall area. During the present season the occurrence of this disease has also been strictly limited to the south-western area, the most western boundary of which is formed by Worcester and Villiersdorp. This outbreak must be attributed to the heavy rains which fell in these areas towards the end of September and early in October. During this period the districts west of this area were subjected to severe, dry south-easters and consequently escaped the disease.

The disease occurs not only on the fruits, but also attacks the young year-old twigs. Such infected twigs, which freely exude gum and die back from their tips, are of very general occurrence on infected trees this season. The infected twigs presumably form the main source of infection during the following season. This form of the disease must not, however, be confused with other symptoms of diseases in apricots which are also attended by exudation of gum. In the case of gum-spot disease, gum is also exuded by the infected twigs, but in this case clearly outlined spots are caused on the shoots, as well as on the fruits and leaves. On the other hand, the gum which sometimes appears on the older branches of an apricot tree is a physiological phenomenon, and is not caused by a disease organism at all. It is important to distinguish between these various gum exudations, since the respective measures for the control of the various diseases differ greatly.

It is impossible to ascertain in advance whether the climatic conditions will again be favourable for the occurrence of this disease next season. Since the damage caused by this disease is so sudden and complete, however, control measures cannot be postponed till the first symptoms of the disease appear. Growers are, therefore, advised to take precautionary measures in good time next season in every case where the disease occurred during the past season.

Control Measures.

In winter, when the trees are being pruned, infected twigs and old mummified fruits must as far as possible be removed and burnt, since they can transmit the disease during the next season. It would be a practical scheme to collect this diseased material before pruning is commenced, otherwise there is the danger of its finding its way into the other prunings on the ground, where it is just as much a source of infection for the new crop.

Blossom-End Rot of Tomatoes.

Dr. Vincent A. Wager, Acting Officer-in-Charge, Botanical Station, Durban.

BLOSSOM-END rot is a disease that often causes considerable losses in an otherwise healthy crop of tomatoes. Only the fruits are affected, and the disease is readily recognized by the brown to black leathery appearance of the blossom-end.

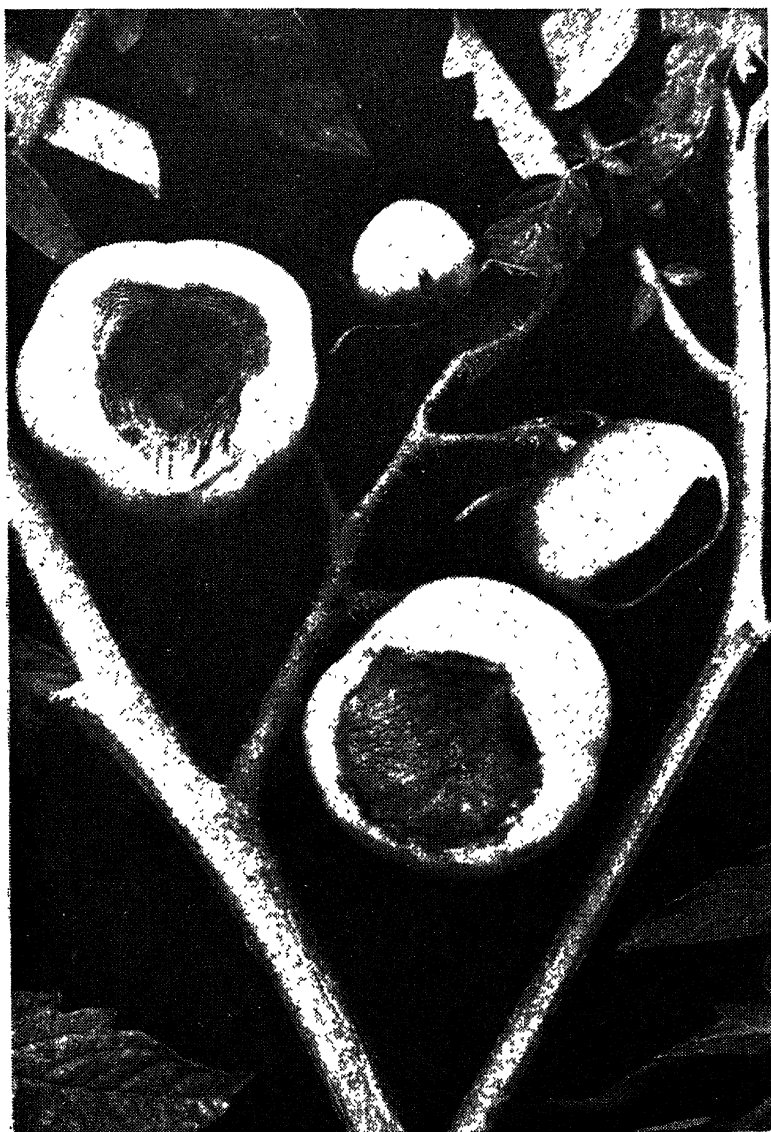


FIG. 1.—Blossom-end rot of tomatoes: the youngest fruit was not affected.

[Photo: V. A. Wager.]

Symptoms.

The trouble usually appears on young tomatoes and starts as a small, green water-soaked spot. This spot rapidly increases in size, and the skin covering it becomes darker in colour, tough, and sometimes wrinkled in concentric rings, while the fruit becomes flattened and does not develop to its full size. The discoloration affects only the peel of the blossom-end, and does not extend into the flesh unless other fungi, bacteria or yeast gain an entrance, in which case the whole fruit may go soft and rotten.

Cause.

Blossom-end rot is what is known as a "physiological disease", which means that it is not caused by any particular organism and is thus not infectious.

Although the actual cause of blossom-end rot is not perfectly understood, it is an established fact that the disease most often develops after a spell of hot, dry weather. When a particularly hot day occurs, especially if it is accompanied by strong wind, most plants give off more water than their roots can supply, so that they begin to wilt. If the dry conditions persist, the plants may not recover; in other cases the leaves may "burn" around the edges, which turn brown. Under such conditions some plants may actually withdraw moisture from their fruits which, as a result, may drop off as in the case of "November drop" of oranges, but in the case of tomatoes blossom-end rot develops. This effect on the tomato fruits begins to become apparent some three to six days after the hot day.

Plants growing on a sandy soil, especially one deficient in humus, are much more affected on a hot day than those on a heavy or clay soil.

It often happens that adverse weather conditions affect only one of the numerous settings of tomato fruits, so that one particular lot of fruits out of a crop have blossom-end rot whereas older or younger fruits are perfectly healthy.

Much less blossom-end rot develops on plants that are toughened by growing continuously under hot, dry conditions than on those which have been used to cool conditions and plenty of water and are then suddenly exposed to a hot, dry, windy day.

Other Factors Involved.

Considerable scientific research has shown that other factors may be involved. In one case ⁽⁴⁾, it was found that when tomato plants were grown in white sand and fed on dilute solutions of the salts they require for growth, no blossom-end rot occurred, whereas it did occur when they were fed on more concentrated solutions. This could be correlated with the fact that on a hot day, when the soil becomes heated, the soil solution would become more concentrated than on a cooler day.

Other investigators ⁽²⁾ and ⁽³⁾ found that lack of calcium in the solution fed to plants growing in sand induced a development of blossom-end rot.

It has also been stated ⁽¹⁾ and ⁽⁶⁾ that, when the disease occurs, it is worse in soils rich in nitrogen, but that this can be off-set by the application of phosphates.

Some research workers have found that certain tomato varieties develop less blossom-end rot than others, but these results do not always hold good for different areas. In an experiment in Texas ⁽⁵⁾

some varieties, including Marglobe, Marvel and Pritchard, were much more resistant than others when grown under identical conditions.

A strong wind on a hot day greatly increases the rate of transpiration and this was shown in one case where the outside row of a field of staked tomatoes had much more blossom-end rot than the inner, or more sheltered rows.

Mulching.

A surface mulch of grass or leaves placed around a plant would keep the soil cooler and help to conserve the moisture. This not only induced very much more vigorous growth of the plant, as shown in the photograph, but caused fewer fruits to become affected by the disease. In this experiment, carried out in Durban, it was interesting to find how greatly the mulch lowered the soil temperature.



FIG. 2.—The effect of a surface mulch on the growth of tomatoes: both plants were the same age and received identical treatment except for the addition of the mulch to the plant on the right.

[Photo: V. A. Wager.]

On a day when the shade temperature was 90°F., the surface soil temperature was 122. Two inches below the bare soil the temperature was 113 and six inches below it was 104. Beneath the mulch it was 81 at two inches, and 77 at six inches below the surface.

Control Measures.

Thus, although it might not be possible to prevent blossom-end rot, there are certain precautions that can be taken. On a hot day, or during a dry spell, the plants should be watered as frequently as possible so as to avoid the alternation of a dry, and then a wet soil. (The ideal would be the use of a sprinkler system.)

Any method should be adopted to conserve the moisture in the soil, such as a cultivation after an irrigation, which would also reduce the competition of weeds, or the making of a surface mulch around the plants by using grass, dead leaves, or lawn or hedge clippings, wherever this is possible, especially when the plants are grown on a small scale.

Lastly, as much humus as possible should be incorporated into the soil, and, when nitrogenous fertilizers such as compost or kraal manure are used, they should be augmented with liberal applications of superphosphate. It is also possible that a good dressing of agricultural lime may help to ward off the trouble.

REFERENCES.

- (¹) FOSTER, A. C.—Environmental factors influencing the development of blossom-end rot of Tomatoes. *Abs. in Phytopathology*, Vol. 27, No. 2, pp. 128-129, 1937.
- (²) LYON, C. B., BEESON, K. C. AND BARRENTINE, M.—Macro-element nutrition of the Tomato plant as correlated with fruitfulness and occurrence of blossom-end rot. *Bot. Gaz.*, Vol. 103, No. 4, pp. 651-667, 1942.
- (³) RALEIGH, S. M. AND CHUCKA, J. A.—Effect of nutrient ratio and concentration on growth and composition of Tomato plants and on the occurrence of blossom-end rot of the fruit. *Plant Physiology*, Vol. 19, No. 4, pp. 671-678, 1944.
- (⁴) ROBBINS, W. R.—Relation of nutrient salt concentration to growth of the Tomato and to the incidence of blossom-end rot of the fruit. *Plant Physiology*, Vol. 12, No. 1, pp. 21-50, 1937.
- (⁵) YOUNG, P. A.—Varietal resistance to blossom-end rot in Tomatoes. *Phytopathology*, Vol. 32, No. 3, pp. 214-220, 1942.
- (⁶) The non-parasitic diseases of Tomatoes. *Agric. Gaz.*, N.S.W., Vol. 56, No. 1, pp. 17-20, 1945.

Green Rot in Apricots:—

[Continued from page 308.]

The trees must be sprayed with Bordeaux mixture during early spring at the following times and at the strengths indicated:—

(a) When the buds begin to swell, but before any parts of the blossoms or leaves are exposed (four lb. copper sulphate and four lb. lime to 50 gallons of water).

(b) At about 75 per cent. petal drop (two lb. copper sulphate and nine lb. lime to 50 gallons of water).

(c) Two weeks after the second spraying [the same mixture as under (b)].

In order to mix a safe and efficacious spray, care must be taken to use lime which has been specially prepared for spraying purposes. Coarse lime may cause irreparable damage to spraying equipment. The lime should also be fairly fresh, otherwise there is the danger of all the copper sulphate in the mixture not being neutralized, in which case the leaves and young fruits may be burnt by the mixture. Any of the various commercial grades of copper sulphate may be used. Large crystals, however, dissolve with difficulty, and should be dissolved either the night before, or in hot water, which wastes much time. In preparing the mixture the copper sulphate should first be dissolved in about two-thirds of the required amount of water. While the solution is being stirred rapidly, the lime is added slowly in the dry state, after which the mixture is brought up to the required volume by the addition of the rest of the water. This mixing process can be carried out directly in the tank of the spray pump in the orchard.

Departmental Inspection and Certification of Seed Potatoes.

L. J. Henning, Senior Professional Officer, Division of Agricultural Education and Research.

POTATO growers wishing to cultivate seed potatoes in apparently suitable areas, for sale under a certificate of the Department of Agriculture, have to comply with certain regulations before forming an association or qualifying for a departmental seed-potato certificate.

Where such a seed potato growers' association is properly constituted under these regulations, the Department will assist in the inspection and certification of seed potatoes, but the Department reserves the right to withhold its inspection services at any time if it is found that an association has violated these regulations or if the area concerned is considered unsuitable for the production of seed potatoes.

Requirements for the Formation of a Seed Potato Growers' Association.

For the formation of such an association, a minimum membership of seven *bona fide* producers is required. No limit to total membership is stipulated.

The area or district must be clearly defined, the members must not reside too far from one another and climatic conditions throughout the production area must be as similar as possible.

For formal recognition of such an association, application must be made to the Secretary for Agriculture, Union Buildings, Pretoria, and must be accompanied by:—(a) The names and addresses of the subscribing members; (b) a description and a sketch plan of the area in which the association is to operate; (c) the expected total acreage to be devoted to seed potato production annually; (d) a copy of the association's domestic constitution; and (e) the name and address of the secretary of the association.

Associations must submit to the methods and standards laid down by the Department for the inspection, certification and grading of seed potatoes.

Duties of Members of an Association.

Farmers who wish to become members of the association, must sign a document to the effect that they are fully acquainted with the departmental regulations pertaining to seed potato growers' associations as well as those of the association and that they undertake to conform to such regulations.

Any member who fails in the observance of any of the Department's or association's regulations, or whose conduct in any respect is, in the opinion of the association's executive committee, prejudicial to the interests of the association, may be removed from the membership list of the association by resolution passed by a majority of at least *three quarters* of the members of the local committee present and voting.

If the executive of an association does not assert itself in regard to disloyal members, the Department has the right to withdraw its inspection services from such members on the recommendation of the inspector serving such an association.

Members of an association must undertake to plant at least *one* morgen of potatoes for certification, except where plantings are made with imported or special seed potatoes produced by the Department.

Every member of an association must undertake to plant only Government certified or certified imported seed. This means that plantings for table production must also be from certified seed potatoes.

Every member must maintain a special seed plot which must be rogued according to the inspector's instructions.

Members must submit their application for inspection to the association's secretary within 3 weeks of planting, together with a full statement concerning: (1) variety; (2) acreage; (3) source of seed (full details); (4) size of seed; (5) date of planting in respect of each field; (6) fertilizers used and quantities per morgen; (7) preceding crops (each land) for past 3 years; (8) a sketch showing the geographical position of the lands and indicating the acreage of the seed planted.

Members must keep a duplicate copy for their own reference.

No member shall grow more than 2 varieties. If a second variety is cultivated, the tubers of the one variety must be coloured and those of the other must be white.

Members must undertake to carry out a system of rotational cropping, correct fertilization and cultivation and to apply timely control of plant diseases and pests, as recommended by the Departments' inspecting officer. Furthermore, all weak and virus-infected plants on lands to be certified, must be removed in good time and certain weeds, including volunteer potato and other virus-carrying crops, must be eradicated within an area of at least 100 yds. around such lands. In areas where volunteer potato plants cannot be easily eradicated, a rotational cropping system covering a period of at least 4 years must be followed.

Supervision of the Management.

It is the responsibility of the executive of an association to see that members carry out roguing on all lands submitted for inspection, according to the instructions of the departmental inspecting officer, i.e. throughout the growing season of the crop, and the secretary of the association must be advised in writing within the period stipulated by the inspector that the required roguing has been completed.

Only those crops will be inspected which, in the opinion of the Department, are sufficiently isolated from other potato fields planted to seed of inferior quality and also from other virus-carrying solanum crops or weeds. It is recommended that tall-growing row crops, such as maize, be grown as isolation breaks around lands offered for certification. Where potatoes for certification are grown in a short cycle of rotation, the land must be thoroughly cleared of all volunteer potato plants.

Where potatoes for certification are planted in large blocks, it is advisable to divide the land into sections of not larger than 10 morgen. Smaller sections are preferable. Each section may then be considered as a separate unit for purposes of inspection.

Inspection.

I. Standard of Inspection for an "A" Certificate.

Crops are inspected by an inspector of the Department at least twice in the field and at least once after lifting. The first inspection takes place about 6 weeks after planting or 3 weeks after emergence of the plants.

INSPECTION AND CERTIFICATION OF SEED POTATOES.

The second inspection takes place during the flowering stage, and at the discretion of the inspector, a third inspection is carried out in the field after the flowering stage and before lifting. This is also the first preliminary inspection of the tubers and is completed by a fourth inspection. A fifth inspection is carried out by the associations' secretary or his authorized deputy, i.e. when the seed potatoes are put into bags, and a departmental certificate for each bag, duly signed by the secretary of the association and the departmental inspector, is issued to the member, to be included in the bags.

This fifth or final inspection by the association, must be undertaken shortly before or at the time of despatch. A representative sample consisting of at least 10 per cent. of the consignment, must then be inspected to ensure that the seed is in good condition when despatched.

Any of the prescribed inspections may be carried out by a member of an association qualified to do so and approved by the Department, provided the departmental inspector agrees that such inspections be carried out in his absence by such a member. A detailed written report of each such inspection must be submitted to the departmental inspector within 7 days.

In order that an association shall have at its disposal one or more members qualified to carry out inspections independently of the departmental inspector, should the occasion arise, the Department is willing to conduct a short course at one or more of its Colleges of Agriculture, once in two or three years, provided a sufficient number of students subscribe to the course.

Standard of Field Inspection.

The following are the instructions for the general standard of inspection of seed potatoes, and tolerances:—

	1st insp. per cent.	2nd insp. per cent.	3rd insp. per cent.
(a) Varietal purity	—	97	—
(b) Minimum per cent. stand ...	90	—	—
(c) Virus diseases—leaf roll	5	.2	—
Virus diseases—other	5	2	—
(d) Bacterial wilt (Vrotpootjie) (<i>Bacterium solanacearum</i>) ...	—	—	—
(e) Other wilts (<i>Fusarium</i> ; <i>Rhizoctonia</i>)	—	3	3
(f) Blackleg (<i>Erwinia carotavorus</i>)	1	1	1
(g) Late Blight (<i>Phytophthora infestans</i>): Penetration to the tubers, or defoliation before field inspection, will render the potatoes liable for disqualification.			
(h) Weeds. At the first and second inspections all weeds may be cause for disqualification. At the third inspection they may be disregarded but solanum weeds*, except in the young stage, are reasons for disqualification.			

Tuber Inspection.

A crop that has passed all three field inspections, will qualify for the fourth or tuber inspection and must fulfil the following requirements:—

- (i) The potatoes must have been out of the ground for at least 4 weeks, and stored under proper conditions.

* *Datura* sp. (stinkblaar, wild gooseberry, black nightshade, etc.

(ii) The seed potatoes must be in heaps in a well-lighted spot which is readily accessible to the inspector, and they must be properly graded into the recommended sizes.

(iii) A representative sample constituting not less than 10 per cent. of the crop, must be inspected.

(iv) The standard of tuber inspection is as follows:—

(a) *Common Scab*.—A tolerance of 5 per cent. infection, determined by count, is allowed. All severe scab-infected tubers must be removed.

(b) *Rhizoctonia*.—All severe rhizoctonia-infected tubers must be removed.

(c) *Internal Brown Fleck*.—Tubers will not be disqualified unless more than 12 per cent. of the total are infected and provided the infection is not severe.

(d) *Late Blight and Blackleg Rot*.—Total disqualification.

(e) *Fusarium dry rot and other rots*.—All affected tubers must be removed.

(f) *Tuber Moth*.—All infested tubers must be removed.

(g) *Eelworm*.—Total disqualification for an A certificate.

(h) *Injury by spades, hoes, etc.*—All cut, bruised, cracked or misshapen tubers must be removed.

Tubers that have once been rejected, will not be eligible for re-inspection.

Not more than two tuber inspections will be carried out by the departmental inspector (one early and one late), unless demanded by circumstances. Members must aim at only one tuber inspection.

The secretary of each association or an appointed deputy must accompany the inspector on all inspections. After each inspection the inspector must draw up a full report on the condition of each crop and a copy must be issued to the grower and the secretary of the association.

Only new bags must be used for the sale of certified seed potatoes.

II. Standard of Inspection for a "B" Certificate.

This standard is in every respect the same as for an A certificate, except that greater tolerances are allowed in regard to the following:—

(a) *Leaf-roll*.—A maximum tolerance of $7\frac{1}{2}$ per cent. is allowed at the first inspection, instead of a maximum of 5 per cent. for an A certificate. For the second inspection a maximum of 2 per cent. is allowed for both the A and B certificates.

(b) *Other Virus Diseases*.—The same as for an A certificate.

(c) *Eelworm*.—Seed potatoes on the land infested with not more than 5 per cent. visible eelworm, determined by count, may come into consideration for a B certificate provided the seeds conform in all other respects to the A or B standard and all visible eelworm infestation is removed before the seeds are put into bags. In such cases, however, an endorsement must be made on the certificates stating that eelworm infestation was found in the field and buyers must be advised in writing of such eelworm infestation. Such seed potatoes are sold only for winter plantings, and must be endorsed thus, "*EELWORM infested—for winter planting only.*"

Seed potatoes which have been certified for an A certificate as regards virus diseases, etc., but which have been found to contain

not more than 5 per cent. eelworm, must be graded to B certificate subject to provisions mentioned above.

Seed Sizes.

Seed potato tubers must be suitably graded into the following sizes:—

(a) Size No. 1:—Small: $1\frac{1}{2}$ to 3 ounces.

(b) Size No. 2:—Medium: 3 to 5 ounces.

(c) Size No. 3:—Large: 5 to 7 ounces, 7 to 9 ounces, etc., increasing by 2 ounces if there is a demand.

Except in cases where a member wishes to re-plant seed potatoes from his seed plot for his own use, no tubers smaller than $1\frac{1}{2}$ ounces are certified.

Not more than $7\frac{1}{2}$ per cent. of the tubers included in a group may be smaller or larger than the size prescribed for that specific group.

Certificates, Seals and Stencils.

Departmental certificates will be supplied to associations on application, and one certificate must be enclosed in each bag of certified seed potatoes. The certificate is valid only if duly signed by the inspector and the secretary of the association.

Each bag of certified seed potatoes must be sealed with a lead or any other suitable seal bearing the mark or initials of the association. Effect must be given to this by all associations. In addition to the label of the association, on which the association's name and the words "*Government Certified Seed Potatoes*" are prominently displayed, the name of the association must appear in bold stencil on all bags.

Sale of Seed Potatoes.

The association has a right to all crops grown by members, certified by the inspector for sale as certified seed. An exemption permitting the private sale by individual members may be made only if circumstances warrant it, and after consultation with the Department.

All seed potatoes produced by members of an association and duly certified by the Department, may be advertised and sold only by the secretary of an association. Only certified seed may be handled or sold by an association.

No member of an association may use his association's name or the name of any departmental or association official in the sale of *uncertified* seed.

No member may sell seed potatoes which have been rejected for bacterial wilt. Such potatoes must be disposed of as table potatoes as soon as possible.

The association's secretary must keep a record of all sales and the numbers of certificates issued to each member in respect of seed potatoes.

Associations are strongly advised, after consultations with the inspector, to dip all certified seed showing signs of scab and/or rhizoctonia in a suitable disinfectant, as soon as possible after lifting. If a poisonous dip is used, buyers of such dipped seed must be warned in writing that the tubers are unfit for human and animal

consumption. An endorsement to this effect must be made on the certificate.

Method of Inspection.

In order to obtain a general impression at the first and second inspections of the condition of the crop presented for certification, the inspector will examine the crop as regards points for disqualification. A crop will be disqualified:—

(1) If the plants are relatively small and stunted in growth due to drought, poor soil conditions, poor cultivation or any other cause. Such a crop is generally more susceptible to diseases and should be disqualified.

(2) If the crop is infested with weeds. At the first and second inspections, all kinds of weeds will give reason for disqualification, but at the third inspection, as stated elsewhere, grasses can be disregarded. The presence of solanaceous weeds (e.g. stinkblaar, gooseberry, black nightshade, etc.), however, are reasons for disqualification of the crop.

(3) If bacterial wilt (vrotpootjie) is detected in plants, especially in areas where the disease has occurred before. The inspector will examine the whole field. This is possible if 10 rows are examined at a time. Mud carried from one field to another, is a probable source of infection, and knives, hands, gum boots, etc., should therefore be disinfected in a solution of formalin when infested plants, tubers and the soil have been handled.

(4) If there is a heavy infestation of late blight, especially if signs of the disease have spread to the tubers.

(5) If it is evident that more than 10 per cent. of the plants are infested with virus diseases. In such a case it will be unnecessary to make counts and the crop will immediately be disqualified.

If the crop is not disqualified on account of any of the above-mentioned conditions, it is inspected in greater detail in the following manner:—

(1) If the plants in a portion of the field differ due to soil variation, different times of planting, disease or any other cause, each portion will be inspected separately, provided the field is planted to seed from one source.

(2) The percentage of virus-infected plants is determined by subdividing the field into at least 2 or more sections, and selecting one or more representative rows of plants in each section. The number of virus infected plants per 100 plants in that particular row, is then carefully counted, and the average of the counts in the various sections calculated.

Determination of Virus Diseases.

It is sometimes difficult to determine whether a plant that exhibits abnormal growth and leaf development is infected with leaf-roll or any other virus disease or not. When examining a crop for symptoms of virus diseases, consideration should always be given to the possibility of somewhat similar symptoms which can be caused by:—

- (i) injury to the roots, due to cultivation;
- (ii) injury to the roots and stems below the ground by cutworms or other insects, as well as damage by hail;
- (iii) rhizoctonia stem infection;
- (iv) drought, cold, wind, frost or other unfavourable climatic conditions;

(v) infertility of the soil, e.g. a pronounced nitrogen shortage, or any other soil condition which retards the normal flow of nourishment from the roots to the leaves, e.g. over-irrigation or lack of air.

In the case of virus infection, the whole plant, and not merely a portion of it, generally shows abnormal leaf development.

Leaf-roll, which is probably the most serious virus disease of potatoes, causes the leaves to curl up and inwards like a funnel and to make a rustling sound when handled. Such infested plants are comparatively small and bushy and the leaves are usually yellowish and sometimes purple or pink at the base and on the veins.

Other virus diseases commonly met with are: (a) ordinary mosaic; (b) virus "Y"; (c) streak disease and (d) aucuba. Possibly virus diseases also frequently account for wild and abnormally large potato plants.

Generally speaking, all plants that show an abnormal or stunted development in comparison with normal plants, may be regarded as virus infected, provided it has been established that their condition is not attributable to injury or any other cause. All abnormal plants must be removed from the field at the earliest opportunity in order as far as possible to prevent the spread of virus infection.

The Duties of Seed Potato Growers' Associations.

1. Persons undertaking the growing of certified seed potatoes, must pay special attention to the crop. Seed potatoes of a high standard can be grown only if all the abovementioned instructions are properly followed.

2. Only through maintaining the highest standards, can an association conquer a permanent market for its produce and be assured of a future.

3. Only through the fullest co-operation and loyalty of members towards their association can success be attained.

Seed Potato Sheds.

In order to satisfy buyers and obviate storage losses as far as possible, members of associations will be well advised to pay serious attention to the erection of well-equipped seed-potato sheds in which proper provision is made for good, indirect lighting for greening the seeds, as well as for adequate ventilation, so that the seeds can be stored for a comparatively long period. Such sheds must also exclude the tuber moth and even plant lice. Information on the building of effective sheds may be obtained from the Department.

The Organization of Seed Growers' Associations.

Associations situated in various areas have organized themselves into groups, viz., regional federations. At present 8 such regional federations are in existence, which together have formed a central body, viz., the South African Seed Potato Growers' Union. The aim of this body is to act as the mouthpiece between the whole organization and the Department, for purposes of furthering the interests of all associations.

It would be highly desirable, and associations may even be required to become affiliated to the existing regional federation of their area. If no such regional federation exists as yet in an area served by an association, such an association may become provisionally affiliated with the South African Seed Potato Growers' Union.

Farming Is a Business.*

III. Sworn Friends of the Future.

O. E. Burger, Division of Economics and Markets.

IN the second article in this series the writer tried to indicate how farmers could become truly familiar with their bookkeeping book.

We know that many farmers in the Union already fully realize the value of figures, bookkeeping, etc., and all that these progressive farmers have been waiting for, is an effective and practical book-keeping book.

Consequently, the Division of Economics and Markets made a careful study of the position during 1938, with a view to compiling an account book which would, once and for all, meet the numerous requirements of farmers. The result of this study was the publication, in 1940, of an "Account Book for Farmers", to which reference has already been made in the previous article. Since in compiling this book the Division sought advice from farmers, it may rightly be said that our farmers made a direct contribution towards the drawing up of their account book.

As we all know, the farming community is made up of numerous classes of farmers; consequently their requirements, as far as book-keeping is concerned, are extremely divergent. The problem with which the compilers were faced was how to satisfy all the farmers.

We feel that we can safely contend that the attempts at satisfying the bookkeeping requirements of all classes of farmers have been successful, but this could be accomplished only by drawing up a bulky book.

Let it therefore be emphasized immediately that it will be unnecessary for every farmer to complete all the available forms; each one need merely use those forms which cater for his own particular requirements. Since the book has been based on the "loose leaf" system, the unnecessary forms may be removed.

But no progressive person will remain satisfied with any rigid system for long; satisfaction comes only from the knowledge that there is scope for development and progress. One of the main objects of this bookkeeping system is therefore, as already indicated, *self-education in bookkeeping*. Consequently, a brief, simple and concise explanation was needed for the Directions (Part I of the set). All that the farmer has to do, if he knows nothing about book-keeping, is to start with the simplest statements as indicated in the explanatory leaflet, and systematically use more forms from year to year as his bookkeeping requirements become more involved. It was mainly to render this possible that the "loose leaf" system was adopted.

Another problem which had to be solved, and which is closely bound up with the idea of self-education, was that of summarizing.

Unless a farmer prefers making entries or calculations of certain subsidiary aspects of his farming enterprise only, he will regard his bookkeeping as futile, if at the end of the year, he cannot summarize the details which have carefully been recorded on the various

* The first article in this series appeared in the January issue of *Farming in South Africa*, and the second in the April issue.

The Overhead Trellis.

M. S. le Roux, Western Province Fruit Research Station,
Stellenbosch.

IN the development of vine trellising the overhead trellis is the most advanced system yet devised. Previously, conditions in virgin forests were imitated and growers simply used live supports such as poplars, willows and other trees.⁽¹⁾ In fact, it was even believed that some sort of beneficial union or symbiosis exists between the roots of certain trees and those of the vine.



FIG. I.—A good view of an overhead trellis on Lourensford Estate near Somerset West, with two rows of fish spine trellis in the foreground.



FIG. II.—An unusual corner construction of the overhead trellis. Unfortunately, the wire stays, instead of being attached to pieces of iron in concrete blocks, run directly into the ground. This will cause trouble in time since the wires are bound to rust at ground level, and snap.

The first non-live supports used were very simple and consisted of a trellis with a single horizontal wire strand. In course of time this system was improved and two, three or more strands were used, one above the other. Subsequently, the discovery that the vine shoot generally yields larger crops of cleaner and better-quality grapes if trained in a horizontal position and allowed to develop to a better size, led to still more complicated systems, especially in the case of table grapes. In this way the "Perold", the Italian fish spine and the slanting trellis came into being.

Eventually the overhead trellis was devised from the above systems. Here the shoots rest quite prostrate and reach the maximum development.

The Construction of the Overhead Trellis.

As shown in figures I and II the overhead trellis consists of a number of poles usually projecting 7 feet above ground level and supporting a network of wire above on which the shoots of the vines can rest. The details of construction sometimes vary considerably but the principle remains the same.

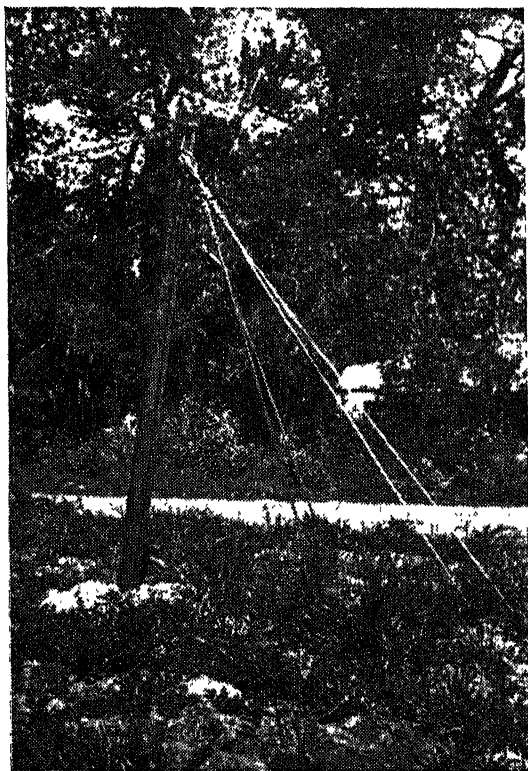


FIG. III.—An imperishable iron corner post slanting backwards and securely stayed with two cables consisting of four strands of No. 8 wire intertwined.

Corner Posts.—In an overhead trellis the corner posts are by far the most important. They should be sturdy, and if possible, practically imperishable (Figure III). Light rails are eminently

suitable for this purpose, but thick wooden poles, treated with creosote to prevent early rotting, are also suitable*.

These poles must be firmly secured to concrete blocks or even fixed objects such as trees in the vicinity. An outward slant of a few feet in the tops of these poles increases not only their strength but also the area of the trellis, at the same time decreasing the tension on the stays. The corner posts are planted three feet into the ground and can be strengthened further by compacting the piece embedded in the soil with concrete. This method is not advisable in the case of wooden poles since with the years these poles will tend to rot off at ground level.

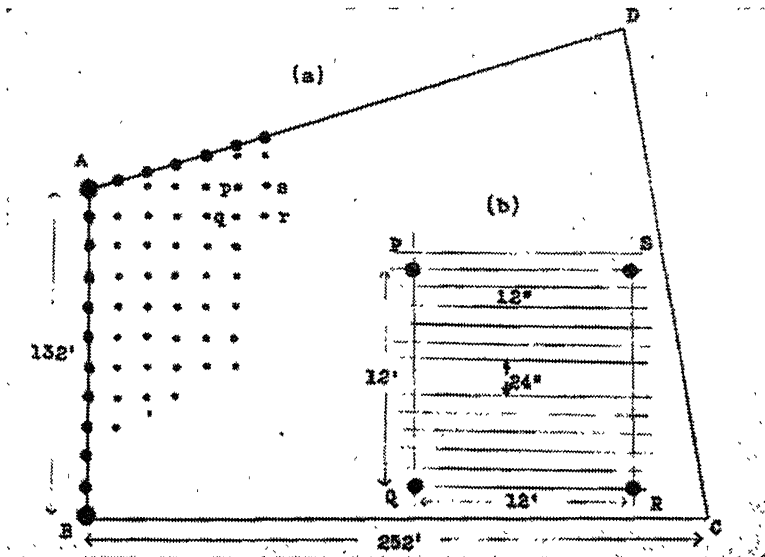


FIG. IV.—Plan of overhead trellis: (a) Note the irregular shape of the trellis plot. (b) Wiring system as between four vines showing detail of one method of wiring.

Outside Straining Poles.—Between the corner posts which need not necessarily form a perfect square or a perfect rectangle, a series of outside straining poles are planted in straight rows round the borders of the plot. (Fig. IV). These poles are planted at the heads of the vine rows on all four sides of the plot and are usually about ten to fifteen feet apart, depending on the width of the vine rows and the distance between the vines in the rows. They consist of treated wooden poles about 4-5 inches in diameter at the thin end, or sometimes of ordinary boiler tubes, about 2½ inches in diameter. Unlike the corner posts these poles need not be imperishable since in the event of rotting, they can be replaced, whereas in the case of the corner posts this cannot be done without slackening the whole wiring system.

Like the corner posts, the outer poles can also slant backwards (Fig. II). The heads of all the poles on one side of the trellis, including those of the corner posts, must remain in perfect alignment.

* Poles of softwood such as pine, are alleged to be more durable than poles of hardwood such as blue-gum, since they absorb the creosote oil better. According to the Department of Forestry, poles treated in this manner are expected to last for 20-25 years.

The strongest position is obtained if the poles are planted into the soil at an angle of 45° . Since this slanting position requires much longer poles and is therefore unpractical, the corner and outside poles are mostly planted in such a manner that the heads lean back, say about two feet.

Stays.—Since the overhead trellis is high and sometimes has to carry a considerable weight, an enormous strain is imposed on it when rain falls after the crop has reached full maturity. It goes without saying, therefore, that firm stays are essential. Concrete blocks are very suitable for this purpose. Big, heavy, rectangular

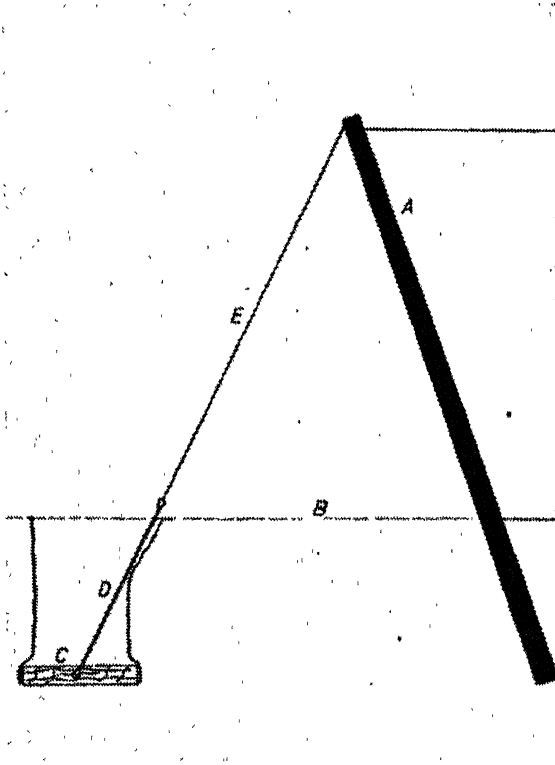


FIG. V.—Side view of stay: A. Outside straining pole; B. Soil surface; C. Block of reinforced concrete; D. Iron rod; E. Several strands of No. 8 wire intertwined.

blocks may be used, but much lighter blocks of 2 ft. \times 2 ft. \times 5 ins. high cost less and are equally effective (Fig. V). These blocks are reinforced with a few strands of old wire and embedded in the soil at a depth of about three feet or deeper in the case of sandy soil. The success of this light stay is due to the large area of the top surface, as the block is kept in position by a heavy column of soil. Like the depth, the size of the stay may vary according to the size of the trellis plot. The retention capacity of the soil is a very important factor and in this connection viticulturists should use their own discretion. Nevertheless it is always advisable to make the stay too strong rather than too weak, even if it does entail higher costs.

The concrete block may be cast direct in a hole dug for this purpose, or, if it is more practicable, a number of blocks may be pre-cast and then buried in the soil. A mixture of one part cement, two and a half parts sand and five parts broken stone of 1 in. diameter will be suitable*. A piece of old iron standard or a $\frac{1}{2}$ in. iron rod or other scrap metal is embedded in the concrete block in such a way that a hook protrudes above the ground; it may also be secured with barbed wire. The wires of the stay consisting of, say 4 strands of No. 8 wire intertwined, can be attached to the hook without coming into contact with the ground where it generally corrodes later on.

The distance between the concrete block and the pole to which its wire stay is attached is very important and usually varies from 3 to 8 feet. The strength of the pole is considerably increased by a greater distance, but unfortunately more space will also be required for the block. When the pole slants backwards, the distance between the pole and the block may be smaller and in this way space can be saved.

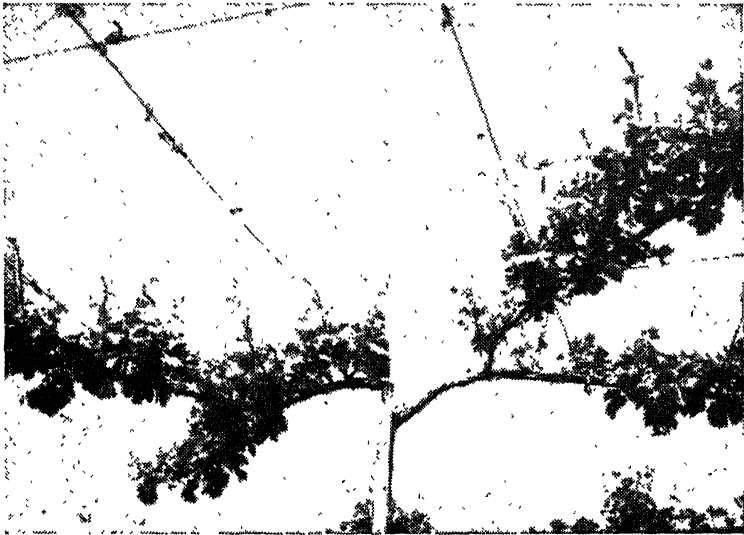


FIG. VI.—A young *Molinera de Gorda* vine on overhead trellising as seen from below. Note the 2ft. by 2 ft. squares formed by the wire netting and the symmetrical spread of the vine.

Inside Standards.—Every vine is supported by a treated wooden pole with a diameter of 1–3 ins. at the upper end. These inside standards should not be unnecessarily thick since they constitute a big item in the total trellising costs. If light supports are used, it may be advisable in the case of large blocks to use thicker inside poles, say every fifth row. If the stem is trained vertically out of the ground, the vine itself will help to support the trellis later.

The base of the support need not extend more than 6 ins. into the ground, and some growers prefer it to rest on the surface where

* One hundred of these 5-inch concrete blocks will require 25 pockets of cement (94 lb. per pocket), $2\frac{1}{4}$ cub. yds. sand and $4\frac{1}{4}$ cub. yds. stone which will amount to about £7. 10s. at the present prices. If the building sand is of a poor quality, one part of cement may be used to two parts of sand and four parts of stone. In the latter case, the total costs will amount to about £8. 10s.

rot is less liable to set in. If the soil is soft, the support should rest on a flat stone or else it will sink into the soil. Another good method which is sometimes applied even in the case of the outside poles, is to use poles which are one or two feet longer than the actual length required and to attach the wire to their sides. Should the lower ends of these poles rot off, they can simply be planted deeper.

The wiring system.—When the poles are in a position and the concrete blocks are firmly compacted, a strong unstretchable wire cable, consisting of about 6 strands of oval No. 12 by 14 or round No. 13 steel wire intertwined, is strained and wound round the outer edge of the trellis and nailed or clamped to the heads of the outside poles on the outside. After this the wire network forming the overhead trellis is strained with similar single strands of galvanised steel wire. There are two methods of doing this. The wires may be drawn lengthwise and crosswise to form a roof consisting of squares with sides of 2 ft. or less (Fig. VI). Alternatively, the wires may all be drawn in one direction, about 9 to 12 inches apart with wires crossing at right angles at intervals to support the structure (Fig. IV, PQRS). The latter system is, perhaps more practical with a view to the removal of the shoots after winter pruning.

To prevent the wires from slipping, especially in cases where the outer cable is by no means rectangular (Fig. IV A-D), barbed wire is sometimes strained together with the cables, to hold the inner wires rigid. Slipping of the inner strands can further be reduced, especially in trellises with a network of squares, by lacing the inner strands, and where necessary, strengthening the points of intersection with binding wire.

Note that all the strands need not be strained when the trellis is constructed, but if preferred, wires may be added as the vine develops. Where the vines are planted densely it may be even be advisable to omit a few wires here and there between the rows so as to allow of better penetration of the rays of the sun (Fig. IV, PQRS.)

Size of Trellis Plot.—Several morgen may be taken up by one unbroken overhead trellis. The only limiting factor as regards the size, is the necessity for paths between the vines. A very large trellis consists of several units such as the one described above. For purposes of construction, however, it is doubtful whether it would be advisable to use more than 3 morgen for one unit, otherwise difficulty may be experienced in straining the wires, etc.

Time of Trellising.—As in the case of other trellises, stays and posts must as far as possible be planted early in winter to enable them to become firmly entrenched during the rainy season. Strain the wires in spring when the expansion is not abnormal and the soil has settled.

Advantages of the Overhead Trellis.

(1) Owing to the better development of the vines, larger crops are obtained per soil unit than in the case of any other system. A yield of twenty tons per morgen is not abnormal for an ordinary table-grape variety.

(2) The quality of the grapes is excellent. The vine develops as well as it would in its original wild state and consequently the growth and the yield are well balanced and defects like non-

setting, are much less common. Bruising, too, is infrequent, since the fruit and the leaves grow in separate horizontal planes.

(3) Cultivation, supervision of labour and inspection are considerably facilitated by the absolute freedom of movement in all directions of man, animal or machine, which is possible under the overhead trellis. Moreover the rows are wide and ploughing can be carried out with ease, lengthwise as well as crosswise. Much manual labour such as digging of ridges is eliminated by this method. Human labour which is the most important cost item in table-grape production is therefore reduced or more effectively controlled.

(4) Under the overhead trellis livestock farming such as poultry farming, pig farming, etc., may be combined with table-grape production.

Disadvantages of the Overhead Trellis.

(1) It is impossible to fumigate such a trellis. The trellis is too large to be covered with a fumigation tarpaulin. In the past this constituted a limiting factor in the use of the overhead trellis since it made the control of mealy bug impossible. The position has been ameliorated however, by the new method of mealy-bug control, viz. the use of ants.

(2) It is often alleged that the height of the overhead trellis makes activities such as pre-thinning, pruning, etc., very tiring. This is undoubtedly an exaggeration. Labourers soon get used to the new position. The work can also be facilitated by the use of convenient step ladders or boxes.

(3) The yield demanded from the overhead trellis is often out of all proportion to its capacity, large as it is, with the result that pigmentation is not satisfactory or the crop is late. In areas or on soil where pigmentation is unsatisfactory, it is in any case difficult to cultivate a variety such as Barlinka successfully on an overhead trellis.

(4) Sunlight does not always penetrate satisfactorily into the overhead trellis. Although in the case of some varieties direct sunlight is not always indispensable to colouring, it is always desirable, for hygienic reasons, that the sun should penetrate sufficiently to give the soil a patchy appearance.

The best way to improve infiltration of light in the overhead trellis is to leave sufficient space between the vines. An espacement of 12 ft. \times 12 ft. to 15 ft. \times 15 ft. should be aimed at.

In really rich soil, good results have been obtained with a space of as much as 400 square feet per vine. The vines should also be correctly pruned and suckered.

(5) Some people maintain that the overhead trellis is more liable to damage by wind. While it is true that owing to its height, the overhead trellis is exposed to stronger wind, it does not seem to sustain more damage as a result of this than any other trellises. This may be due to the fact that the circulation of air is much freer under the overhead trellis than in the case of other trellising systems, so that the wind is not checked with so much force, with the result that the damage is minimized. At the same time, better aeration makes for healthier grapes, one of the reasons being that the fruit dries more easily after rain.

(6) Satisfactory topping is not possible in the shoots of vines on an overhead trellis. Since, however, the vine can develop more freely, its growth is better balanced and topping is not so important.

(7) The overhead trellis cannot be recommended unless conditions are favourable, since otherwise the big expenditure involved will not be justified.

Conditions under which the Overhead Trellis can be Recommended.

The overhead trellis is recommended only when:—

1. The vines are sufficiently vigorous to cover the trellis. For this to be possible the soil should be fairly deep and fertile and irrigation water is usually, but not invariably, required. The variety planted should be a fairly vigorous grower which will thrive as a large vine. Hanepoot, e.g., is not always successful on overhead trellising. There are, however, some exceptions.

2. Conditions are favourable for pigmentation.

Construction Costs of the Overhead Trellis*.

The costs will vary according to the size and shape of the trellis, the quality of the material, espacement, hardness of the soil, etc.. The larger the plot and more especially the squarer the shape, the wider the spacing and the heavier the soil, the more economical the construction of the trellis will be.

The specifications given below are for a square trellis comprising an area of 1 morgen. It is made of vertical iron corner straining posts and chemically treated wooden outside poles obtained from the Department of Forestry. The vines are 10 ft. × 12 ft. high and

Construction Costs of an Overhead Trellis Comprising One Morgen-1940 (Transport Costs Excluded).

	£ s. d.	£ s. d.
4 corner posts, light (used rails) at 5s. each.....	1 0 0	
110 outside straining poles (creosoted wood) length, 10 ft., diameter upper end 4-5 inches, at £13. 15s. per 100.....	15 2 6	
750 supports, treated wood, length 7 ft. 6 inches diameter, upper end 1½-1¾ in. at £1. 3s per 100.....	8 12 6	
TOTAL, POLES.....		24 15 0
118 iron stays, iron piping (used) length 5 ft., diameter, 1½ in. at £2. 10s. per 100.....	2 19 0	
50 pockets of cement (94 lb. per pocket) at 2s. per pocket....	3 0 0	
6 cub. yards broken stone, diameter 1 inch at 7s. 6d. per cub. yard	2 5 0	
3 cub. yards building sand at 4s. 6d. per cub yard.....	0 13 6	
TOTAL, STAYS.....		8 17 6
21 rolls galvanized wire No. 12 × 14, about 1,600 yards per 100 lb. roll at £1. 12s. per roll.....	33 12 0	
4 rolls galvanized wire No. 8, about 460 yards per 100 lb. roll at 9s. per roll.....	1 16 0	
TOTAL, WIRE.....		35 8 0
Nails, length 2½ in.....	0 3 0	
Clamps, length ¾ in.....	1 2 6	
TOTAL, NAILS AND CLAMPS.....		1 5 6
Labour, unskilled.....	5 0 0	
TOTAL, UNSKILLED LABOUR.....		5 0 0
TOTAL COSTS (TRANSPORT COSTS EXCLUDED)....		75 6 0

* The writer would like to thank Mr. G. van Velden of the experiment farm Bien Donne, Groot Drakenstein, for assistance with the collection of some of the data.

the wire is strained in both directions at intervals of 2 ft. The soil is ordinary loamy soil. The prices quoted are those prevailing in 1940. At that stage the price of wire had already risen considerably. Since the cost of the wire constitutes about 47 per cent. of the total costs of the trellis, it is a very important factor to consider. With the particulars given below, it should be possible after making a few enquiries about the prevailing prices of material, to make an estimate of the approximate costs of a trellis at any given time.

LITERATURE.

MANARESI, A. (1936).—*Notizie storiche e sugli alberi usati sino dall' antichità in Italia come tutori per le viti.* (Historical and cultural notes on the trees used in Italy as supports for vines). Ann. Soc. Agrar. Bologna. 1936, Vol. 64. Horticultural Abstracts, I.A.B., Dec. 1938, 1016.

Farming is a Business :—

[Continued from page 320.]

statements. This is, indeed, the only manner in which he can calculate the financial result of his year's business. It was in this respect that the old commercial system of bookkeeping was so clumsy and unintelligible for the farmer and was consequently responsible for so many frustrated efforts.

In the explanatory pamphlet, the following three methods of summarizing are suggested and explained—each one adapted to the number of details which the farmer wishes to record:—

(1) A method for the majority of farmers who are interested only in the total income and expenditure of their farming concern as an indivisible unit. This is the obvious method for purposes of income-tax returns.

(2) A method for the comparatively large number of farmers who take a particular interest in the capital investment in their farms. The financial result of the year's business may also be calculated in this manner, and moreover, the farmer has a simplified and valuable balance sheet at his disposal at the end of the year.

(3) A method for the individual who takes an interest in the analysis of the various branches of his enterprise. Here too, provision is made for the calculation of the final result for the farm as a whole.

In the following article it will be indicated to what extent the farmer will be rewarded for his sacrifice of the time and effort in keeping books, i.e., if he follows the system of the "Account book for Farmers."

Wool Produced in the South-Eastern Orange Free State.

J. C. de Klerk, Sheep and Wool Officer, College of Agriculture, Glen.

IN this article, which is a sequel to a previous article* on the value and quality of wool produced in the south-eastern Orange Free State, i.e. in the districts of Springfontein, Trompsburg, Smithfield, Bethulie, Edenburg, Dewetsdorp, Rouxville, Reddersburg, Wepener and Zastron, the wool yields of these districts for the last two years are compared, with the object of determining whether the fact that the 1945 clip was subjected to a period of severe drought whereas the 1944 clip experienced favourable climatic conditions, caused any considerable differences in the physical characters of the wool.

Quality of Wool.

The Trompsburg district is taken as an example, since it is more or less representative of the surrounding districts.

In the following table a comparison is made between all fleece wool clipped in this district from the beginning of the shearing-season until the end of December for the years 1944 and 1945.

SEASON 1944-45.			SEASON 1945-46.		
Number of bales of fleece wool analysed: 910.			Number of bales of fleece wool analysed: 825.		
	Bales.	Percentage.	Bales.	Percentage.	
1. Type—					
Weaving wool.....	573	63	552	64	
Good top.....	298	32.7	232	28	
Inferior top.....	39	4.3	41	8	
2. Length—					
A-length, 2½ in. and longer..	371	40.7	373	45.2	
B-length, 2¼ in. and longer	355	39	305	37.3	
C-length 1¼ in. and shorter..	184	20.2	147	17.5	
3. Fineness—					
Fine wool.....	568	62.4	506	61.3	
Medium wool.....	323	35.5	298	36.1	
Strong wool.....	19	2.1	21	2.5	

From the above it is clear that there is hardly any difference in the quality of the wool for the two seasons, as regards the percentage of weaving wool, good top, etc. The quantity of inferior wool is slightly bigger, and this may be ascribed to the larger percentage of extremely dirty back wool due to sand and dust picked up by the sheep on lands. In more favourable years this wool could have been wool of a good top type.

In the classification for fineness the difference is even smaller. What little difference there is, is in favour of more medium and strong wool. As regards length, there was more wool of A length than the previous year.

* The first part of the series appeared in the April 1945 issue of *Farming in South Africa*.

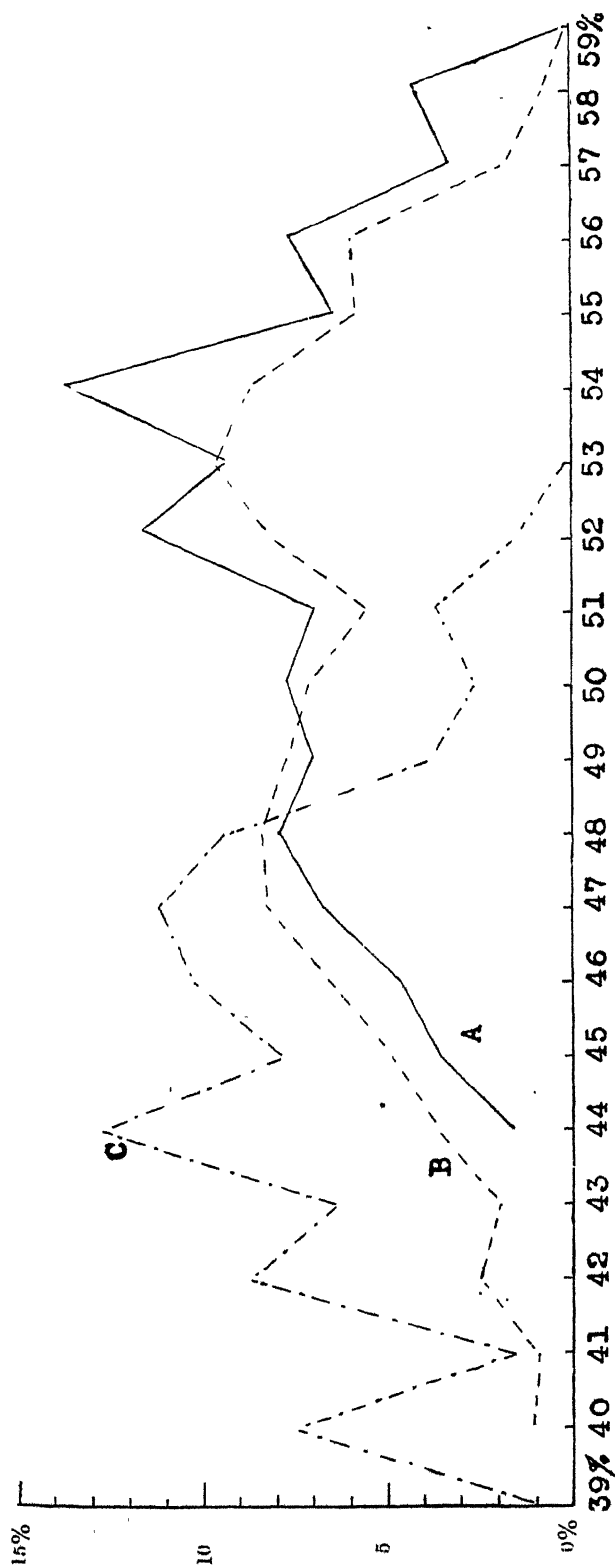


FIG. 1.—Graph indicating the seasoned yields—

A—of 6,645 bales of fleece wool from the south-eastern Orange Free State for the season 1944-45..

B—of 6,860 bales of fleece wool from the south-eastern Orange Free State from the season 1945-46.

C—of 880 bales of fleece wool from the diversified farming areas for the season 1945-46.

N.B.—The figures along the vertical line indicate the type percentage.

Condition of Wool.

Some farmers were dissatisfied with the prices obtained this year, when there had already been a 5 per cent. decrease on last year's prices. It has been pointed out that there was a small improvement in the length of the clips but the real setback was due to the large quantity of impurities such as sand and dust absorbed into the wool. These impurities were responsible for a considerable increase in weight, a factor which is no less important in price fixation than length, fineness or type.

The graph shows the scoured yields of 6,645 bales of fleece wool on a percentage basis for the season 1944, as well as the scoured yields of 6,860 bales of fleece wool from the same area for the 1945 season.

In addition, the graph shows the scoured yields for the same period of 880 bales of fleece wool from the mixed-farming areas, Excelsior, Winburg, Theunissen, Brandfort, Bloemfontein, Ladybrand, and Thaba Nchu. The wool from these districts is remarkably heavy (mainly on account of sand and dust from the lands) as compared with that from the grassveld Karroo areas. Last year, e.g., the scoured yield of back wool from the mixed farming areas was as low as 24 per cent.

Decrease in the Wool Clip.

It is well known that the wool clip of the Union decreased considerably during the past few years. This decrease was especially noticeable in the wool received at the port of East London, e.g.:

<i>Year.</i>	<i>Number of Bales received.</i>
1940-41.....	213,579
1941-42.....	207,700
1942-43.....	198,599
1943-44.....	185,517
1944-45.....	175,859

The data kindly made available by a certain broker in East London, made possible a tabular analysis of the returns received by certain clients who in the past ten years have more or less regularly sent their clips to the firm.

TABLE SHOWING THE NUMBER OF BALES OF WOOL SENT TO A CERTAIN BROKER BY CERTAIN FARMERS FOR A NUMBER OF SUCCESSIVE YEARS.

Client.	District.	1935/ 36.	1936/ 37.	1937/ 38.	1938/ 39.	1939/ 40.	1940/ 41.	1941/ 42.	1942/ 43.	1943/ 44.	1944/ 45.
A.	Winburg.....	14	16	14	14	13	—	13	15	9	8
B.	Brandfort.....	15	14	13	—	23	13	12	10	6	—
C.	Reddersburg.....	17	14	14	15	—	—	14	12	5	4
D.	Dewetsdorp.....	43	34	39	41	38	45	45	26	23	17
E.	Hobhouse.....	10	11	10	15	11	9	9	6	4	—
F.	Zastron.....	10	15	10	9	11	6	6	7	4	—
G.	Ladybrand.....	—	11	10	8	9	9	8	8	6	4

From the analysis of the fifty clips taken, it is clear that the decrease was most marked in the districts of Zastron, Hobhouse, Theunissen, Reddersburg, Smithfield and Rouxville.

Red Scale on Citrus and its Control by Natural Factors.

Dr. G. C. Ulyett, Officer-in-Charge, Parasite Laboratory, Division of Entomology, Pretoria.

WITHIN recent years cases have occurred in various parts of South Africa in which natural control factors have provided an efficient check to the increase of red scale in citrus orchards. In most of these, the scale population has remained as low as that normally experienced in orchards which receive a regular and thorough annual fumigation; in some, the population has been even more effectively reduced. Since this satisfactory state of affairs is found in widely-separated parts of the country with somewhat different climatic conditions (e.g., the Transvaal and eastern Cape Province), it is pertinent to enquire whether natural control can not be extended to cover a larger proportion of the citrus-growing areas of the Union.

With this view, the writer has devoted some time to a study of the natural enemies of scale insects and has recently completed a tour of the main citrus-growing areas, the object of which was to make a comparative survey of the situation throughout the country. Unfortunately, the severe drought which has marked the 1945-46 growing season and which has had such a disastrous effect on the important citrus area of the eastern Cape Province, has rendered any useful comparison impossible at this stage. In spite of this, however, sufficient has been learnt to make it worth-while to place certain conclusions before growers and to point out the fundamental requirements for any attempt to effect a more widespread establishment of natural control.

The Agents of Natural Control.

Past experience has shown that a satisfactory control of an insect by its natural controlling factors is usually accomplished by means of a complex of such factors and not by any one factor operating alone. There are a few exceptions to this rule, but red scale is not one of them. Although the composition of this complex may vary according to geographical position, or the relative importance of the constituent factors may change from time to time or from place to place, it is still as a complex of factors that natural control will function. The degree of control attained will depend not only upon the individual efficiency of the constituents, but also upon the way in which these factors interact one with another. The study of this aspect is a difficult and complicated one and is best left to the specialist in this particular field.

Within the framework of the complex we find a number of different types of control factor. Among these are parasites, predators, disease and environmental factors such as tree condition and weather. All of these are very closely interrelated and fluctuations in the scale population are intimately bound up with fluctuations or alterations in one or more of these factors. The application of chemical measures of control will, of course, alter this arrangement considerably and will tend to eliminate the good effects of the living members of the complex. Since this will break up the

complex, it is easy to see that natural and chemical control are not compatible as a general rule.

Parasites and predators are among the most important of the factors concerned in natural control. These are found wherever scale insects exist, and are together capable of exerting a very appreciable degree of control. In South Africa we possess a very efficient complex of these natural enemies which have not been given a fair chance to prove their worth. Six different species of parasitic wasps are known to attack and destroy red scale in citrus orchards. Of these, two are very common and can give a high percentage of parasitism. By themselves, however, parasites cannot give sufficiently high control for commercial purposes.

The predatory insects include a number of ladybird beetles, lace-wing flies, the larvae of certain midges and mites. It is a common belief that ladybird beetles and their larvae are the most important of the natural enemies and that they are capable of giving a higher control than parasites. This is probably because the latter are inconspicuous and are therefore not as easily observed at their work. It is by no means definitely established that predators are the more important. It is rarely possible to obtain exact data relating to the number of prey destroyed by a predator.

Although several different species of ladybirds are found in citrus orchards, it does not follow that they all feed upon scale insects. Many of them do not do so, while others are merely very occasional feeders. Laboratory tests do not help us very much here, since the beetles will feed, and often breed, on a number of very different artificial media in captivity, especially if they are forced to do so. Thus, certain of the common aphid-feeding species will thrive on small moth larvae, insects which are never attacked in Nature. Beetles have also been reared on hard-boiled eggs, a diet which could not be called normal by the utmost stretch of the imagination. It is therefore only by direct observation in the field that the normal feeding habits can be ascertained.

Many ladybirds and lace-wings are only casual feeders on scale; their more usual food consisting of mealy bugs or aphids which are present in the orchard. The value of such species in the control of scale is therefore problematical in the extreme and is probably always very small. Thus, while the common black *Evochomus* beetle is often abundant, its effect on the scale population is generally negligible.

In spite of their numbers and their gross feeding habits, we can say of the predators, as of parasites, that they could not by themselves produce a satisfactory commercial control of scale. It is only by the establishment of a mixed population of parasites and predators (i.e., a *complex* of natural enemies) within the orchard that such control becomes possible. It would be a fallacy to place emphasis on one or the other of these two groups.

Environmental factors may sometimes produce a marked effect on scale populations, either directly or indirectly. For example, weather will indirectly influence mortality by determining the degree to which disease can destroy the scale. Diseases are favoured by a high humidity and high temperatures so that they can become important in areas having a high rainfall or a high atmospheric humidity as is the case in certain coastal regions. Inland, where the climate is much drier, disease will be negligible as a control

factor. Weather may have a direct effect on scale populations through the incidence of favourable or unfavourable temperatures for development, through drought or through unduly heavy rainfall. These aspects have been described elsewhere and it is not possible to go more fully into them here. In certain cases, however, they will have a direct bearing upon the success which is attained by the parasites and predators. It is easy to see that if weather is detrimental to the natural enemies while allowing the scale to continue breeding, the former will be unable to keep the latter in check.

Among other environmental factors, the question of tree condition is important. There is no doubt that scale insects, and particularly red scale, prefer healthy, young and vigorous trees. Neglected orchards, where the trees have received no proper attention for a considerable period and have consequently lost condition, are almost invariably remarkably free from scale. On the other hand, orchards which are well kept, are more liable to very heavy infestations. Variations in tree condition may be produced by a number of factors, among which are the available plant food, water and cultural treatment. It is necessary to bear all this in mind in order to avoid confusing the unsuitability of the tree for the scale with the control by natural enemies.

Neglected orchards, however, cannot be regarded as normal ones and will not be considered here. We are concerned with commercial groves in which the recognized cultural practices are carried out. In such groves the trees will be in a condition which will favour increase of the scale and, under present conditions, will be subjected to fumigation regularly in order to prevent heavy outbreaks of the insect. Under these circumstances, parasites and predators will suffer very heavily by being killed off along with the scale. The complex can no longer function as a whole and we cannot expect to find that natural control will become established in such orchards unless a radical change is made in the management. How is this to be brought about?

Conditions Necessary for Natural Control.

The presence, in sufficiently large numbers, of both parasites and predators is the first essential. Although they may be found in most orchards, they are usually prevented from breeding up sufficiently to reach the desired abundance. The conditions necessary to enable them to do this are suitable climatic conditions and a reasonably large scale population on which to breed. In most, if not all, of our citrus-growing areas, the climate is favourable to the natural enemies. It is therefore the second of these conditions which is unfavourable and this is caused by the practice of regular and thorough fumigation or spraying of the trees. Not only does this treatment destroy large numbers of the parasites and predators themselves, but it also reduces the scale population to such a low level that no breeding up of any large population of natural enemies is possible. Hence there are comparatively few of these in a normal commercial grove.

The situation is aggravated by the practice of summer fumigation. During the warmer months, parasites and predators are active and are reproducing, whereas during the winter their activity is either considerably reduced or practically ceases. Summer

fumigation, therefore, is calculated to do the greatest amount of harm to these useful insects.

Since the parasites and predators of scale insects are almost invariably present in citrus orchards, albeit in small numbers, the main essentials for their encouragement and the eventual establishment of natural control are a sufficiently large scale population to start with and a cessation of artificial control of the scale. This means that the grower who wishes to enjoy the advantages of natural control must actually encourage a certain degree of scale infestation over a period sufficient to enable the parasites and predators to establish populations which are capable of dealing with the situation at a later date.

This does not mean that a heavy infestation is necessary in the orchard. Indeed, this would be undesirable for several reasons. We do not desire to prolong the time required for this population to be controlled by natural enemies; nor is it desired to kill the trees. The type of infestation that would meet the case might be described as a medium one, i.e. one that is well below the danger point as regards the tree itself.

It must be emphasized that before natural control can become established, *there must be a minor outbreak of scale*. This, of course, involves a certain loss of exportable fruit during the period of establishment and here lies the major problem which must be faced by the grower. It is noteworthy that, in the few cases where we can definitely say that natural control has become established, this has happened either by design or by accident. In each case, the orchard in question has been left unfumigated for a period of at least two years, irrespective of the existing scale population. In each case, no further fumigation has been necessary since. Some of these orchards have remained under natural control for from four to six years, and the results have been equal to those obtained by regular annual fumigation.

Suggestions for Consideration.

Before discussing the solution of the practical difficulties involved, it is as well to draw attention to two important points regarding natural control as it affects citrus orchards. In the first place, although natural enemies are known to occur in nearly all orchards in this country, there is no guarantee that they will eventually control scale even though the necessary steps are taken to encourage them. As has been mentioned above, fluctuations in the populations of both scale and its natural enemies are often influenced by other environmental factors, and these may operate to limit the degree of control exerted by parasites and predators. Satisfactory natural control may therefore never be attained. This is seldom likely to happen, but should nevertheless be borne in mind. Secondly, natural control may not always give the same high degree of control every year, although it has become well established. Again, other factors may cause a diminution in control in certain years, but this will be temporary and the control will almost invariably become re-established in the following year. As an example, drought may be the direct cause of mortality in the scale population, as it has been during the present summer. This will reduce the scale population at the critical time when parasites and predators are breeding up, and so will deprive them of a suitable

quantity of food. The result will be a much reduced population of natural enemies which will not be able to cope with any sudden increase in the scale population. There will therefore be an outbreak of scale until parasites and predators are again in a position to control it.

In establishing natural control, the major problem to be faced is one of finance. The loss of a large proportion of the exportable fruit during the first two years must be provided for in each case. This does not present any very great difficulty for the larger estates. In their case, individual orchards can be turned over to natural control as required and the whole process is a gradual one extending over a period of years until the whole estate is dealt with. Moreover, a reserve fund can be put aside for the purpose, this sum being looked upon as capital expenditure. The results obtained from the permanent control extending over future years will represent a substantial profit on this investment, since the costs of fumigation are high and these will now disappear.

It is the small grower, who depends upon his grove for a substantial part of his annual income, who will be unable to afford this loss. Furthermore, the size of his grove often precludes any gradual change-over such as that mentioned above. In this case some financial provision needs to be made in order to tide him over the necessary period. This could best be done by the co-operative societies who, if they wish to help their members in this problem, should devote any spare profits to a special fund for the purpose.

Without any further detailed research on the subject, we know that natural control can become effective in citrus orchards in this country if it is once established. We also know that there are times when this control will tend to break down temporarily and supplementary measures become necessary in order to safeguard the health of the trees. The establishment and maintenance of natural control in citrus orchards is not the simple problem that is provided by the present methods of control. It requires the guidance of a competent entomologist who is versed in the intricacies of biological control and should not be undertaken lightly.

Sale of Blowfly Spray.

As from 1 June 1946 Blowfly Spray will be available in one (1) gallon and five (5) gallon drums at 6s. and 23s. respectively. These prices include the drums, which become the property of the buyer of the spray and will not be accepted for refilling. Possessors of 25 to 45 gallon drums may forward these, railage paid, to the Director of Veterinary Services, Onderstepoort, Pretoria North station, to be refilled. The name and address of the sender must be painted clearly on the drums. No unmarked drums will be received. The price of Blowfly Spray in such owners' drums is 3s. 6d. per gallon.

Enzymes in Foods.

F. J. H. le Riche, Western Province Fruit Research Station,
Stellenbosch.

FOODS are either dead or alive. Fruit and vegetables, for example, are stored in a living state, whereas meat is invariably stored as dead material. Both these groups of food are subject to decay which is caused either by micro-organisms, which come from contamination, or by enzymes, which exist in living tissue. The number of micro-organisms can be greatly reduced by keeping environmental conditions clean, but enzymes have to be treated in special ways.

Enzymes are special proteins built up by the plant for the purpose of accelerating the chemical reactions that must go on if the tissue is to live. After the death of the tissue many such substances continue to function, and they cause the disintegration known as autolysis when enzymes only are present, and as decay when both enzymes and micro-organisms are present.

These protein substances are of considerable importance in the preparation and preservation of fruit and vegetable products. They are mainly responsible for the destruction of vitamin C in freshly expressed fruit and vegetable juices, shredded or pulped material, and during ordinary storage owing to the presence of ascorbase, an enzyme that catalyzes oxidation of ascorbic acid. During sun-drying, fruits darken owing to the action of oxidizing enzymes. Overripe or crushed fruits lose much of their jellying power because of pectolytic enzymes. Yeast fermentation is, of course, a classic example of a set of reactions involving enzyme action. Enzymes may cause undesirable changes in flavour and odour in frozen-pack fruits and vegetables. Pectin-splitting enzymes are utilized in the clarification of fruit juices.

In the home preparation of fruits and vegetables, high percentages of valuable nutrients are lost on account of the action of enzyme systems. The nutritive value of these products consequently decreases and in periods of severe shortages, when all foods must be conserved, people may suffer from deficiencies due to the incorrect handling of fruits and vegetables prior to cooking or fresh consumption.

Preventing Effects of Enzyme Reactions.

The most important precaution against the destructive effects of certain enzymes in living material is the elimination of excessive cell rupture; this includes bruising, cutting, shredding and mincing. When fruits and vegetables are subjected to these practices, large amounts of the enzymes are liberated with the cell sap, which are then responsible for the rapid destruction of ascorbic acid. Experiments have proved that in the shredding of fresh cabbage, up to 50 per cent. of its ascorbic acid is destroyed within a period of 15 minutes. Should the temperature and hydrogen-ion conditions be favourable for the reactions of the enzymes, the destruction may be still greater. This also applies to the majority of other vegetables.

The general practice in homes of preparing fruit and vegetable salads by fine cutting, shredding or mincing of the fresh material and then allowing this to stand for long periods prior to eating, is

to be condemned and not encouraged at all. If these foods must be cut into very small pieces, this should be done immediately before eating, and the foods kept in a cold, slightly acid medium. The application of vinegar or lemon juice to fruit and vegetable salads greatly assists in retaining the ascorbic acid, by slowing down the enzymic reactions.

The practice of shredding or slicing vegetables, e.g. beans, potatoes and carrots, the night before cooking them, lends itself to severe criticism, as minerals are leached out and enzymes destroy a large percentage of the nutritive elements of these vegetables.

The recommended procedure, which will result in a higher retention of ascorbic acid in the home preparation of fruits and vegetables, is to avoid the unnecessary liberation of enzymes at favourable temperatures and in high hydrogen-ion concentrations and to carry out the home preparation processes in a minimum of time. Enzymes should be inactivated as soon as possible. This is successfully done by immersing the vegetable in boiling water for at least 5 minutes. Blanching can also be done in live steam. If possible, cabbage should be cooked by putting small quantities of whole leaves into boiling water. The enzymes will immediately be inactivated and larger percentages of ascorbic acid retained. Vegetables may be cut or minced, as desired, with a minimum amount of loss, after having been blanched.

During periods when protective foods are scarce, or in areas where fruit and vegetables are not produced in large quantities, it is essential that the nutritive elements be retained and that the destruction caused by certain enzymes be eliminated as far as possible.

In the industrial preservation of fruits and vegetables, the inactivation of respiratory and other enzymes of fruits and vegetables by scalding or blanching is now well established as an essential practice. The heating, however, often causes profound modifications in texture, may cause the formation of undesirable cooked flavours, and may bring about the loss of desirable elements such as soluble salts and vitamins. For the above reasons, considerable attention has been paid to the development of blanching procedures which are adequate for the necessary destruction of the enzymes, but which will result in a minimum of the undesirable changes.

In the factory processing of foods, the most desirable and effective measures of enzyme inactivation are employed, and it may safely be stated that canned vegetables very often contain more nutritive elements than so-called fresh vegetables as prepared in many homes.

In the dehydration, canning and freezing of fruits and vegetables, the inactivation of the oxidizing enzyme systems is the most important operation in order to maintain quality and palatability. In freezing and dehydration, satisfactory products have been obtained by blanching vegetables for 3 to 6 minutes at 90-100°C. Such products retain their good quality for long periods.

Nature of Enzymes.

In order to discuss the action of enzymes, it is necessary to know more about these substances.

An enzyme may be defined as a heat-labile catalyst, elaborated by living cells, yet capable of acting independently of the life

processes of the cell. As an example, invertase may be taken; it is an enzyme secreted by living yeast cells. It can be isolated from yeast by suitable means and will still retain its power of catalyzing the inversion, i.e. hydrolysis of cane sugar into laevulose and dextrose. Enzymes are rendered inactive by heat, and invertase is inactivated by heating to 80°C. In this respect it and other enzymes differ from simple chemical catalysts such as platinum black, manganese dioxide, etc., which are not destroyed by heating at or below 100°C.

Theoretically, enzymes merely catalyze on existing reactions; but actually there is proof that they also initiate reactions. An example of the latter fact is that in a pure cane-sugar solution there is no detectable change to invert sugar, but if invertase is added, the inversion is initiated and proceeds rapidly.

A very important characteristic of enzymes is that they are specific in their action. Inorganic catalysts are usually capable of catalyzing a number of very different reactions. On the other hand, enzymes are usually limited to the catalysis of a single reaction, or group of similar reactions. For example, invertase can bring about the hydrolysis of sucrose, but cannot similarly affect lactose or maltose, although these other two sugars have the same empirical formula as cane sugar, $C_{12}H_{22}O_{11}$, and both are disaccharides. In similar ways, emulsin, tyrosinase, laccase, ascorbinase, etc., are specific in their action.

Although each enzyme is generally supposed to be a definite chemical substance, enzymes are classified according to the nature of the substrate, or according to the character of the transformation induced by the enzyme.

Some of the better known groups of enzymes, which are convenient for purpose of comparison and discussion, are given below:—

(1) *Hydrolytic enzymes*.—These include sugar-inverting enzymes, e.g. invertase, maltase and lactase; pectolic enzymes, e.g. pectase and pectinase; protein-splitting enzymes, e.g. pepsin, trypsin, papain, bromelin, etc.; as well as lipases, diastases, tannases, urease, etc.

(2) *Oxidizing enzymes*.—They are the most important in fruits and vegetables and the following systems are of importance, viz. peroxidases, dehydrogenases and oxidases.

(3) *Other groups of enzymes*, which are also of importance, may be classified under the reductases, catalase, zymase, mutases and the clotting enzymes, which include rennin (the milk-clotting enzyme), and thrombase (the blood-clotting enzyme).

Enzymes are complex systems and are greatly influenced by heat, hydrogen-ion concentration (pH) and radiation. The velocity of the enzyme action is greatly affected by temperature. Experimentally it has been proved that, within certain temperature limits, the velocity is increased by rise in temperature until an optimum temperature causes a decrease in the velocity until the inactivation temperature, at which the enzyme is rapidly destroyed, is attained. The optimum temperature is effected by the hydrogen-ion concentration, the ratio of substrate to enzyme, and numerous other factors. For most enzymes the optimum temperature lies between 40° and 50°C. An increase of 10°C causes the reaction velocity to increase 2 to 3 times. Beyond the optimum temperature, the rate of inactivation of enzymes by heat rapidly decreases. This temperature, however, depends upon the pH value of the medium, upon whether the

enzyme is in solution or dry, and upon the length of the heating period. In a solution at the optimal pH value of the enzyme and in the absence of substrate, the inactivation temperature for most enzymes, heated for 5 minutes, lies between 75° and 85°C.

Short wave-lengths of light, particularly those of the ultra-violet range, exert a destructive effect on some enzymes. Ultra-sonic radiation rapidly destroys the peroxidase of fruits. X-rays appear to be less destructive than ultra-violet rays on enzymes.

There are various explanations of and theories on, the manner in which enzymes bring about transformations. These theories cannot be discussed in this paper, but they agree, however, on the assumption that an intermediate compound of substrate and enzyme is formed, as is true for other catalysts.

Enzymes play a very important rôle in all the different aspects of food processing and preservation. They are responsible for the destruction of vitamins, of which vitamin C is the most important, and also for colour changes, breakdown of pectolic substances and general deterioration of the quality and palatability of preserved foods.

Summary.

Regarding the importance of rapid enzyme destruction in fresh fruit and vegetables, it may be stated that, in the usual methods of preparing these foods in homes and institutions, up to 60 per cent. of the ascorbic acid is lost, while quality and palatability may be subject to a 20 per cent. deterioration. These losses are due largely to excessive cell rupture, favourable temperatures for enzymic action and to low acidities of the substrate mediums. These conditions should be made as unfavourable as possible so that no undesirable reactions can take place. Vegetables which are rich sources of destructive enzymes are, cabbage, cauliflower, cucumbers, tomatoes, spinach, lettuce, potatoes, beans, carrots and peas. All other vegetables are also rich in such enzymes and should be handled with similar care and rapidity.

In the cultivation of the abovementioned vegetables, it thus becomes evident that only the most suitable varieties with high antiscorbutic values and low enzyme actions should be grown. Extensive work on the suitability of different vegetable varieties for processing and fresh consumption has been conducted, and the results will be published in the near future.

It is axiomatic that vitamin concentrates and synthetic vitamins should not be used when natural food sources are available in adequate amounts. However desirable in theory it may be to adhere to this precept, practical considerations may demand deviation from it. The incorrect handling and preparation of many foods contributes to the unnecessary destruction of nutritive elements and the need for synthetic products.

Dryland Wheat.

F. X. Laubscher, College of Agriculture, Potchefstroom.

SINCE last summer yielded poor crops, many farmers are now pinning their hopes on a better winter-cereal crop and have, no doubt, made large-scale preparations for the cultivation of wheat on dryland. This method of cultivation can be successfully applied over a large portion of the summer-rainfall area, provided that spring rains are not too late. In the western Transvaal and the western Orange Free State, however, this entails too great a risk.

The sowing of dryland wheat is, of course, contingent on adequate autumn rains and early rains the following spring when the wheat reaches the flowering stage.

During the winter months, May to July, and even as late as August, transpiration and water absorption is negligible in wheat. Farmers will therefore have to rely on the autumn rains for purposes of ploughing and cultivating the soil so that a reserve supply of water can be absorbed into the soil for maintaining the wheat until the spring rains set in. The sowing season and the following spring are critical times for dryland wheat. For this reason it is better to sow the wheat in moist soil with sufficient reserve moisture to maintain the plants until late spring than to sow it in dry soil in the hope that late rains will fall in time for germination.

Moisture in Spring.

Dryland wheat which has been established in autumn and tided over the winter by judicious management, is liable to dry out as soon as the warm spring weather sets in and the growing plants require more moisture. This is the period when a moisture reserve in the soil is so vitally necessary. A dry spring involves a much greater risk and one which is more difficult to combat than unfavourable conditions during the sowing season. The water requirements of the plants increase in warm weather and consequently, if the plants reach the flowering stage before the spring rains set in, there is little hope of a successful wheat crop.

Management.

Farmers should aim at establishing their wheat crop well before the winter but they should see that the crop is not too luxuriant or leafy, since this will exhaust the moisture reserves and lower the crop's resistance to spring drought. If the crop is well established and shows signs of a strong vegetative development before winter, light grazing is advisable.

The plants should be strong but not leafy. Similarly, the crop should be grazed lightly after any warm period during winter likely to stimulate leaf development. This will prevent the crop from developing too luxuriantly. This type of grazing, designed, as it is, to arrest development, is of special importance with the advent of spring since it prevents the plants from sprouting before the chances for rain are fairly favourable. The fact must not be lost sight of that grazing may have a very detrimental effect on the plants and cause a considerable decrease in the yield if applied after the wheat has reached the piping stage. The chief aim of this system should therefore be to delay the piping and the

flowering stage as far as the particular wheat variety and the prevailing weather conditions permit. The value of the grazing obtained from wheat sown in autumn will offset some, if not all the costs entailed by cultivation, seed, etc. Since there is always a certain degree of risk attached to the cultivation of dryland wheat as a cereal in the summer-rainfall area, the provision of winter grazing should be the chief aim, and the possibility of a cereal crop should be a secondary consideration, depending on conditions in spring. A dry spring will minimize the chances for a cereal crop. It goes without saying, therefore, that under such conditions any available wheat will be more valuable as stock feed. Wheat which reaches the flowering stage during a period of drought, should be used for grazing.

Varieties and Areas.

Scheepers is the most important variety sown as dryland wheat in autumn (March-April). It thrives well in the dryland wheat area of the Orange Free State, the eastern Transvaal and the north-eastern Cape Province. Scheepers may be regarded to-day as one of the world's finest drought-resistant varieties and its main advantage lies in the fact that early high temperatures do not increase its rate of development to any appreciable extent. Where many other varieties sprout and form ears at the first sign of warm weather, Scheepers maintains a steady rate of growth and this variety literally seems to wait for the summer rains before sprouting. But even this variety does not remain hardy indefinitely. If the spring rains are too late, it too, will die. For this reason Scheepers may sometimes be sown even later if winter rains happen to fall, although earlier and faster-growing varieties would be the obvious choice, for the secret of success with dryland wheat lies in the resistance of a variety to drought and heat in spring.

In the southern Orange Free State there seems to be a revival of the old Red Victoria variety under the name of Victory. This variety has the same defects as Scheepers and is, if anything, even more susceptible to blight, but it does not sprout as well as the latter under similar conditions. Its main advantage lies in the fact that, because of its long growing period, so much of the spring is spent in the vegetative stage.

In those areas, where the winter is particularly severe, Red Egyptian offers a good alternative. In fact, early varieties have little scope under dryland farming, except after winter rains. Spring Early (in the Free State) and Gluretty (in the north-eastern Cape) appear to be popular choices, although farther north Malkasarwali will probably do better. This variety yields good results on the Springbok Flats, although actually autumn cropping is the practice there. Its main drawback is that it might be killed by frost in the florescent stage.

Under dryland conditions the seed should be sown more sparsely than under irrigation, namely, 60 to 80 lb. of seed per morgen, either by means of a wheat drill or by hand and worked in by means of a disc harrow.

Stinking smut in wheat can effectively be controlled by means of such fungicides as Ceresan, Arasan, Agrosan. An application of superphosphate at the rate of 200 to 300 lb. per morgen or of an equal quantity of mixture E (4-12-0), is recommended. Such fertilizer may be sown either by means of a drill or may be broadcast

before ploughing. Soils which have been fertilized for summer cereals need not be treated again.

Wheat after Maize.

The practice of sowing wheat immediately after maize or *vice versa* has in the past presented many difficulties in those cases where land is limited.

The practice which has gained favour during the war years, namely that of planting maize in wide rows so as to allow of inter-row cultivation with a disc harrow, seems to offer a partial solution to the problem, in that it enables the farmer to work his winter cereals into the soil between the wide maize rows, when carrying out his final cultivation operations. This practice is, however, by no means simple, involving, as it does, a high degree of mechanization and is indeed based on a tractor disc harrow unit. The growing winter cereal presents no problem in the harvesting of maize, but maize stalks form an obstruction when the wheat is cut. This problem can be solved by allowing the lands to be grazed during early winter. Maize stalks grazed in conjunction with green pasturage constitute a good and palatable supplementary feed. Another solution appears to be to cut and remove the maize plants prior to the harvesting, but on account of the scarcity of labour, large-scale operations in this respect seem to be impracticable. It seems clear, however, that wide maize rows and sufficient agricultural implements hold the key to a better soil utilization and a healthier rotational cropping system involving both maize and wheat.

Farmers, who wish to obtain the necessary wheat seed, should approach their local co-operative society or some other agent of the Wheat Control Board or communicate direct with the latter body, P.O. Box 908, Pretoria.

Popular Bulletins.

(1) Calf Rearing—Bulletin No. 224. Price 3d. Obtainable from the Editor, Department of Agriculture and Forestry, Pretoria.

(2) The Export of Fresh Grapes from the Union of South Africa during the Ten-year period, 1930-39—Bulletin No. 225. Price 6d. Obtainable from the Chief, Division of Horticulture, Pretoria.

(3) Soft Cheese as a Food—Bulletin No. 229. Price 3d. Obtainable from the Editor, Department of Agriculture and Forestry, Pretoria.

IMPORTANT NOTICE.

Will persons who place orders for vaccines please note that:—

- (a) No refund of the purchase price or credit will be made if purchasers return the vaccine to the Department.
- (b) Such returned vaccine will always be destroyed.

Ask for Price List of Laboratory Products and note the correct addresses.

The Farm Home.

(A Section devoted mainly to the interests of Farm Women.)

Making Woollen Blankets.

Miss. S. Snyman, Home Economics Officer, Pretoria.

ALL too frequently skins with long wool are not utilized when beautifully warm, light blankets could be made from them.

Shorn wool may also be used but since it tends to become knotted, and the knots are difficult to comb out, shorn wool should be handled with great care. Take a sheepskin with wool about 2 in. long or longer and, using a sharp knife or blade, cut it into 1-inch strips, working from the inside. Soak these strips overnight in water to which ammonia has been added. Use 1 tablespoon ammonia to 1 gallon water. This soaking process facilitates washing since all the loose sand is removed in this way.

Washing Process.

Now make a soap solution by dissolving $\frac{1}{4}$ lb. shredded soap in every quart of water. Add sufficient of this solution to a basin or bath of lukewarm water to obtain a good lather. Add ammonia again to remove all the grease from the wool. A disinfectant may also be added to impart a clean smell to the wool. Thoroughly wash the wool in this solution. If the wool is very dirty, a second washing will be necessary. Rinse in lukewarm water three times or more.

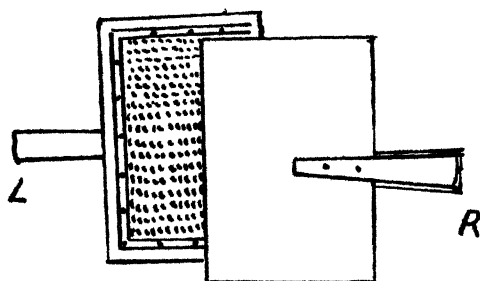


Fig. 1.

Wring out as much of the water as possible and hang the wool up to dry. Shake the wool every now and then while drying to loosen.

If shorn wool is used, it should not be rubbed much but merely pressed up and down and then spread out on a gauze frame to dry.

As soon as the wool is dry, it is cut off next to the skin, fluffed and all burrs and steekgras removed. The wool is now ready for combing.

Combing Process.

Hold one wool comb, teeth upwards, in the left hand (Fig. 1). Place a small quantity of wool on the comb. Using the right hand take another wool comb and, holding it teeth downwards, comb the

wool by lightly drawing this comb over the comb in the left hand. Place more wool on the comb and comb it out. Keep on adding wool until the lower comb is full. Remove the wool by combing in the opposite direction.

Coarse and coloured wool is less compact than merino wool and produces a lighter blanket.

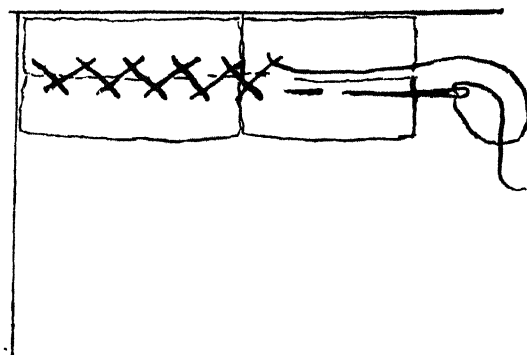


Fig. II.

REQUIREMENTS FOR BLANKETS AND STANDARD MEASUREMENTS.

Children's Blanket: (45 in. \times 28 in.)

2½ yds. material (downproof material is most suitable).

1½ yds. muslin.

50-53 pieces of combed wool.

3¼ to 4 yds. string or cord (¼ in. in diameter).

Small Children's Blanket: (35 in. \times 22 in.)

1½ yds. material.

¾ yd. muslin.

22 to 24 pieces of combed wool.

3½ yds. string or cord (¼ in. in diameter).

Single Bed Blanket: (3 ft. 6 in. \times 6 ft.)

8 yds. material.

8 yds. cord.

4 yds. muslin.

116 pieces of combed wool (\pm 3 lb.). A double bed blanket (5 ft. 6 in. \times 6 ft. 2 in.) should not weigh more than 5 lb.

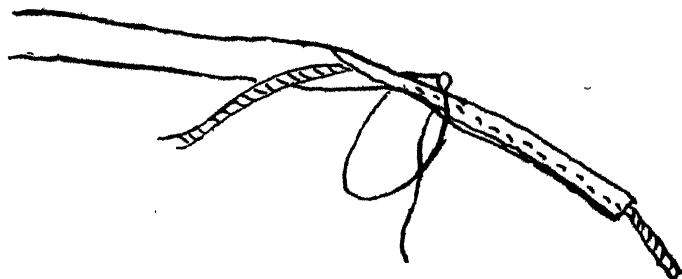


Fig. III.

Making the Woollen Blanket.

Cut a piece of muslin the exact size of the blanket. Fold in the ends about ½ in. and tack. Next, lay the pieces of combed wool edge to edge in rows along the width of the blanket and stitch

them to the muslin, using herring-bone stitch, taking care not to pull the thread tight (Fig. 2). Cover the whole surface on the one side of the muslin in this way. Now turn the work and sew a layer of wool to other side in the same way, but this time the pieces of wool are placed along the length of the blanket.

If you have no downproof material, proceed as follows: Take a piece of muslin twice the length of the blanket and stitch the wool lengthwise to the one half of the muslin and crosswise to the other half. Now fold it in half so that the two layers of wool form the centre, with a lining of muslin on the outside.

The cover of the blanket is made as follows. Cut strips of material on the bias or on the straight, about $\frac{3}{4}$ in. wide and join them until you have a strip long enough to go round the blanket. Fold the strip and tack it over the string or cord. (Fig. 3). Tack the strip firmly round the cord without pulling or creasing it. Now tack the covered cord to the right side of one side of the cover in such a manner that the rough edge of the cord cover corresponds with the rough edge of the blanket cover. (Fig. 4).

To obtain neat square corners trim the cord cover at the corners. Tack the second part of the blanket cover on which the pattern

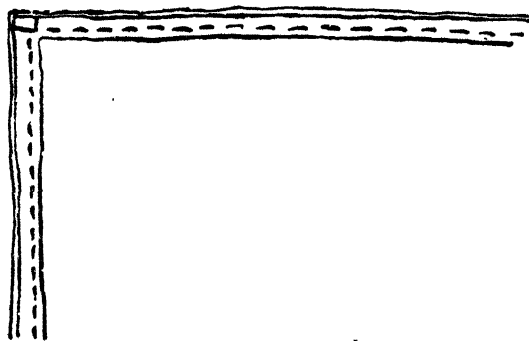


Fig. IV.

(where the blanket is to be stitched through) has been traced, to the first. The two right sides are now on the inside with the cord between the two sides. Stitch against the cord, leaving an opening of 18 in. on the one side. At this opening the cord is stitched to one side of the cover only.

If your machine has a special cord foot, the work will be considerably facilitated.

Remove all the tacking-threads and place the muslin with the wool on the finished cover. Tack the sides of the muslin to the seams of the cover, but see that the stitches do not show on the outside. Now turn the cover so that the muslin with the wool is inside and neatly sew up the opening.

Tack through all the layers of the blanket, lengthwise and crosswise so that the material will not move when the pattern is stitched. Choose a pattern in which the stitching is never more than 5 in. apart.

Baby blankets can be stitched by hand. Make 4 or 5 holes in the blanket for air. A frill may be sown in instead of a cord. Proceed in the same way as for the cord.

Information on Departmental Publications.

Farming in South Africa, the monthly journal of the Department, contains popular as well as scientific articles on a variety of agricultural topics, useful to both the farmer and the housewife, while the Crops and Markets Section supplies information on crop prospects, market prices and exports of agricultural produce.

The following particulars in regard to subscriptions and advertisements should be noted —

Subscription.—Within the Union, South West Africa, Bechuanaland Protectorate, Southern Rhodesia, Swaziland, Basutoland, Mocambique, Angola, Belgian Congo, and British Territories in Africa, 5s. (otherwise 7s. 6d.) per annum, post free, payable in advance.

Applications, with subscriptions, to be sent to the Government Printer, Bosman Street, Pretoria.

Advertisements.—The Tariff for Classified Advertisements is: 2d. (two pence) a word with a minimum of 5s. per advertisement (prepaid). Repeats, not entailing any change in the wording, will be published at half the cost of the original.

Conditions:

- (1) The advertisement will be classified under specific headings, and only one black letter (initial letter) is permitted.
- (2) Advertisements in which prices are mentioned must contain the name and address of the advertiser. A nom-de-plume or box number only is not sufficient, and unless this condition is strictly observed, advertisements will not be accepted.
- (3) Advertisements will be classified strictly in accordance with the subject-matter of the announcement, determined by the first item mentioned and cannot be inserted under irrelevant headings.
- (4) Displayed, classified advertisements will also be accepted. The charge, however, will be 10s. per inch, single column, per insertion, without reduction for repeats.

Copy for Advertisements to be in the hands of the Government Printer, Pretoria, not later than the 20th of the month preceding publication.

Send all advertisements direct to the Government Printer, or write to him for details as to tariff for advertisements.

Popular Bulletins.—Bulletins on various agricultural topics are published by the Department to meet public demand. A list of available bulletins giving particulars of cost, etc., is obtainable free of charge from the Editor, Department of Agriculture, Pretoria.

Scientific Publications.—From time to time the different Divisions of the Department issue science bulletins incorporating the results of research work conducted by them. Other scientific publications issued are: "The Onderstepoort Journal", "Memoirs of the Botanical Survey of South Africa", "Bothalia", "Entomological Memoirs" and the "Annual Reports of the Low Temperature Research Institute". Information in regard to these publications is obtainable from the Editor, Department of Agriculture, Pretoria.

Press Service.—The Press of South Africa is now supplied with a bulletin of agricultural information for their exclusive use. This information is supplied to all newspapers and other journals throughout the country.

Farmer's Radio Service.—In addition to the printed information supplied by the Department to members of the farming community, the Department, in collaboration with the South African Broadcasting Corporation, also has a national broadcasting service for farmers. Information in regard to times of broadcasting is contained in the programmes issued by the Broadcasting Corporation.

Inquiries.—All general inquiries in regard to the above should be addressed to the Editor, Department of Agriculture, Pretoria.

D. J. SEYMORE, Editor.

Crops and Markets

A Statistical and Economic Review of South African Agriculture

by

The Division of Economics and Markets

Volume 25

MAY 1946

No. 285

CONTENTS

	PAGE
Price Review for March 1946*	349
Index of Price of Field Crops and Animal Products	350
Slaughterings of Cattle at Abattoirs	350
Prices of Slaughter Stock for the 1946-47 Season	352
Agricultural Conditions in the Union during March 1946	353
Maximum Prices of Potatoes	354
Maximum Prices of Eggs	354
Prices, Tables, and Index	355

Price Review for March 1946.*

Fruit.—The markets were reasonably supplied with fruit, and prices remained firm. The supply of deciduous fruit, except for apples, gradually declined. Larger quantities of citrus fruit reached the markets towards the middle of the month, and the demand was keen. Consignments of tropical fruit increased considerably. Bananas were still scarce and dear. On the Cape Town market the prices of bananas increased from 54s. 3d. per crate in February to 69s. 7d. per crate in March; on the Johannesburg market from 12s. to 17s. 3d.; and on the Pretoria market from 13s. 8d. to 28s. 6d.

Tomatoes.—The supply of tomatoes declined on all markets, and prices increased somewhat. On the Johannesburg market the prices of ordinary tomatoes increased from 1s. 7d. per tray in February to 3s. 8d. per tray in March; on the Cape Town market from 1s. 11d. to 2s. 6d.; and on the Durban market from 1s. 3d. to 1s. 6d.

Vegetables.—Larger supplies of vegetables reached the markets and the prices of beans, peas, cabbages and pumpkins declined slightly. Carrots, however, showed an increase in prices. On the Johannesburg market the prices of carrots increased from 7s. 3d. per bag in February to 8s. 10d. per bag in March; on the Cape Town market from 7s. 11d. to 8s. 1d.; and on the Durban market from 14s. 1d. to 23s. 10d.

* All prices mentioned are averages.

Potatoes.—The supplies throughout were fair. The Johannesburg market was well supplied with potatoes from the highveld. Fewer potatoes from the Transvaal reached the Port Elizabeth market, and supplies were not always sufficient.

Onions.—Fair supplies reached the markets, and prices remained firm. The Johannesburg market was well supplied with good quality Cape Onions.

Sweet Potatoes.—Larger quantities of sweet potatoes reached the markets, and sales were very satisfactory. Prices increased somewhat.

Fodder.—Lucerne and hay were scarce and dear. The Johannesburg market was well supplied with sweet grass but the quality was poor.

Eggs and Poultry.—Egg consignments decreased during the month, and poultry consignments were generally small. New increased maximum wholesale and retail prices of eggs in the controlled areas were announced on 29 March 1946 (see article elsewhere in this issue).

Index of Prices of Field Crops and Animal Products.

THIS index (see table elsewhere in this issue) remained unchanged during March, viz. at 171. The most important changes which occurred in the various groups are the following:—

(a) *Hay* (i.e. lucerne and teff) increased from 151 in February to 160 in March as a result of a slight increase in the market price of lucerne.

(b) *Other Field Crops* (i.e. potatoes, sweet potatoes, onions and dry beans) decreased from 308 in February to 283 in March as a result of decreases in the market prices of potatoes, onions and dry beans. For new maximum control prices of potatoes, see article elsewhere in this issue.

(c) *Slaughter Stock* (i.e. cattle, sheep and pigs) decreased from 175 in February to 171 in March as a result of the further seasonal decrease in the prices of slaughter stock.

(d) *Poultry and Poultry Products* (i.e. fowls, turkeys and eggs) increased from 256 in February to 277 in March as a result of the increase in the price of eggs. For new maximum control prices of eggs, see article elsewhere in this issue.

Slaughterings of Cattle at Abattoirs.

THE table below gives the total number of bulls, oxen, cows and calves slaughtered annually at the 38 most important abattoirs of the Union.

This information was obtained from the monthly bulletin of the Office of Census and Statistics, and the figures represent between 70 and 80 per cent. of the total slaughterings of cattle at the Union abattoirs.

CROPS AND MARKETS.

Slaughtering of cattle at 38 most important Abattoirs of the Union.

	Bulls.	Oxen.	Cows.	Calves.	Total.
	No.	No.	No.	No.	No.
1938...	7,942	387,339	78,053	53,989	527,323
1939...	6,317	397,687	73,114	57,213	534,331
1940...	6,369	444,378	80,015	60,142	590,904
1941...	7,322	501,264	103,202	71,365	683,153
1942...	8,191	528,540	123,077	77,939	737,747
1943...	9,996	489,255	141,884	78,727	719,862
1944...	5,856	410,805	102,920	81,919	601,500
1945...	6,234	461,364	127,116	87,003	681,717
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
1938-39 to 1944	82	105	136	147	113
1938-39 to 1945	87	118	168	156	128

From the above table it appears that the total number of cattle slaughtered was approximately 200,000 more in 1942 than in the two pre-war years. Subsequently it again decreased somewhat, especially as a result of the continuous drought conditions since 1942.

The increase in the slaughterings of the different classes of slaughter cattle is of special importance. It appears as if there was a proportionately greater increase in the number of cows slaughtered during the war. In 1945 68 per cent. more cows were slaughtered than in 1938 and 1939 as against 56 per cent. more calves, and 18 per cent. more oxen, while the slaughterings of bulls decreased.

The percentage of cows as against the total number of cattle slaughtered thus also increased, namely, from about 15 per cent. for the pre-war years to almost 19 per cent. in 1945.

This increase in the slaughterings of cows may appear alarming as it might create the impression that the country is engaged in the killing off of breeding cattle.

On the other hand it must be pointed out that according to agricultural census statistics the number of breeding cattle increased proportionately more than other cattle, namely, as follows:—

Number of Cattle owned by Europeans (in Rural Areas only).

	1937.	1943.	Percentage of 1937 to 1943.
	No.	No.	%
Under 1 year.....	1,023,581	1,313,930	128
Cows and heifers, 1 year and over.	2,760,537	3,465,007	126
Bulls and oxen, 1 year and over	2,344,469	2,646,321	113

It therefore appears quite natural that an increasing number of old and inferior cows should reach the abattoirs. Provided that no large-scale slaughtering of suitable breeding cattle took place (and apparently it did not), the larger slaughterings of cows during recent years can only have been advantageous to the cattle herds of the country, since more of the inferior and poor quality cows were disposed of in this manner.

Prices of Slaughter Stock for the 1946-47 Season.

THE prices of slaughter stock in operation at the end of the 1945-46 season were published in the July 1945 issue of "*Crops and Markets*". The abovementioned prices have, however, been reduced in all controlled areas by 1s. per 100 lb., as from 15 April 1946 to 21 April 1946, by a further 1s. per 100 lb. as from 22 April 1946 to 28 April 1946, and by yet another 6d. per 100lb. as from 29 April 1946 to 16 June 1946.

In regard to pig carcasses, the price of one class only, viz. "Roughs" has been increased to 6d. per lb. as from the 15 April 1946, the prices of all other classes and grades remaining the same. An additional grade for pig carcasses has, however, been added, viz. "Undergrade", and the price fixed therefor is 3½d. per lb. as from 15 April 1946.

The new basic prices of slaughter stock in all controlled areas for the 1946-47 season come into operation on 17 June 1946. The new basic producers' prices of slaughter stock are given in the following table, namely, per 100 lb. for cattle and per lb. warm dressed weight for calves, pigs, lambs, sheep and goats.

	Cape Town.	Durban and Pieter- maritzburg.	Pretoria.	Witwaters- rand.	East London, Bloemfontein Port Eliza- both and Kimberley.
	s. d.	s. d.	s. d.	s. d.	s. d.
Calves per lb.—					
Grade I.....	0 8	0 8	0 8	0 8	0 8
Grade II.....	0 6	0 6	0 6	0 6	0 6
Pigs per lb.—					
Suckers, super...	1 3½	1 3½	1 3½	1 3½	1 3½
Porkers, grade I.	0 11½	0 11½	0 11½	0 11½	0 11½
Porkers, grade II	0 10	0 10	0 10	0 10	0 10
Baconers, grade I	1 0	1 0	1 0	1 0	1 0
Baconers, grade II	0 10	0 10	0 10	0 10	0 10
Sausage pigs.....	0 9	0 0	0 9	0 9	0 9
Larders.....	0 7½	0 7½	0 7½	0 7½	0 7½
Roughs.....	0 6	0 6	0 6	0 6	0 6
Undergrade pigs.	0 3½	0 3½	0 3½	0 3½	0 3½
Cattle per 100 lb.—					
Super.....	68 0	64 0	67 0	67 0	64 0
Prime.....	59 0	55 0	58 0	58 0	55 0
Grade I.....	51 0	47 0	50 0	50 0	47 0
Grade II.....	44 0	40 0	43 0	43 0	40 0
Grade III.....	37 0	33 0	36 0	36 0	33 0
Grade IV.....	23 0	19 0	22 0	22 0	19 0
Lambs per lb.—					
Super.....	1 0½	1 0½	1 0½	1 0½	0 11½
Prime.....	0 10½	0 11½	0 11½	0 11½	0 10½
Grade I.....	0 10	0 11	0 10½	0 10½	0 10
Sheep per lb.—					
Super.....	0 10½	0 11½	0 11	0 10½	0 10½
Prime.....	0 9½	0 10½	0 10	0 9½	0 9½
Grade I.....	0 8½	0 9½	0 9½	0 9	0 8½
Grade II.....	0 6½	0 7½	0 7½	0 7	0 6½
Goats per lb.—					
Grade I.....	0 7½	0 8	0 7½	0 7½	0 7½
Grade II.....	0 6	0 6½	0 6	0 6	0 5½

In addition to the above prices, the producer also receives the proceeds derived from the sale of offal, hides and skins. The producer pays all charges relating to railage, slaughter fees, commissions, etc.

Seasonal increases in the Prices of Slaughter Stock.—The above-mentioned producers' prices of slaughter stock will be increased by the following amounts during the periods as specified:—

	Per 100 lb. dressed weight.	
	s.	d.
17 June 1946 to 23 June 1946, by.....	0	6
24 June 1946 to 30 June 1946 by.....	1	0
1 July 1946 to 7 July 1946 by.....	1	6
8 July 1946 to 14 July 1946 by.....	2	0
15 July 1946 to 21 July 1946 by.....	2	6
22 July 1946 to 28 July 1946 by.....	3	0
29 July 1946 to 4 August 1946 by.....	3	6
5 August 1946 to 11 August 1946 by.....	4	0
12 August 1946 to 18 August 1946 by.....	4	6
19 August 1946 to 25 August 1946 by.....	5	0
26 August 1946 to 1 September 1946 by.....	6	0
2 September 1946 to 8 September 1946 by.....	7	0
9 September 1946 to 15 September 1946 by.....	8	0
16 September 1946 to 22 September 1946 by.....	9	0
23 September 1946 to 29 September 1946.....	10	0
30 September 1946 to 6 October 1946 by.....	11	0
7 October 1946 to 13 October 1946 by.....	12	0
14 October 1946 to 20 October 1946 by.....	13	0
21 October 1946 to 27 October 1946 by.....	14	0
28 October 1946 until further notice by.....	15	0

In the Cape Town area the basic prices of slaughter stock as given above will, notwithstanding these increases, be further increased by 1s. per 100 lb. dressed weight as from 30 December 1946 to 23 March 1947.

In the Durban and Pietermaritzburg areas the basic prices of slaughter stock as given above will also, notwithstanding these increases, be further increased by 3s. per 100 lb. dressed weight as from 1 July 1946 to 1 December 1946.

The prices of slaughter stock will thus be increased by 6d. per 100 lb. per week as from 17 June 1946 tot 25 August 1946, and from 26 August 1946 by 1s. per week until further notice.

For further particulars see *Government Gazette Extraordinary* No. 3629 of 5 April 1946.

Agricultural Conditions in the Union during March 1946.

Rainfall.—General rains fell over practically the entire Union and conditions in the country as a whole were considerably alleviated

Condition of Stock.—Pastures as well as the condition of stock improved considerably as a result of the general rains. Lumpy skin disease occurred in widespread areas, and also horsesickness which caused some losses.

Crops.—The maize crop benefited greatly by the rains. Early frosts will, however, cause severe damage to the crop which in general will be below the average. The summer crops will be below normal as a result of the late rains. Wheat prospects appear promising.

Maximum Prices of Potatoes.

THE maximum prices of potatoes in the controlled areas, as fixed on 21 September 1945 (see November 1945 issue of "*Crops and Markets*") have been decreased from 15 March 1946, namely, as follows:—

By direct sale from producer to retailer the maximum prices are 31s., 30s., 26s. 6d. and 22s. per bag (150 lb.) free-on-rail for 1st grade sized, 1st grade unsized, 2nd and 3rd grade, respectively. The corresponding previous prices were 34s. 6d., 33s., 30s. and 24s. per bag, respectively.

When sales are affected by auction or otherwise by an auctioneer, market agent, broker or other agent on behalf of a producer, the maximum prices for the corresponding grades have been fixed at 31s. 9d., 30s. 9d., 27s. 3d. and 22s. 9d. per bag, respectively, including commission. Railage may, however, be added to the prices. When sales are executed on behalf of a producer by a market master, the prices for the corresponding grades are 33s. 6d., 32s. 6d., 29s. and 24s. 3d. per bag, respectively, including railage, commission, transport and other market charges.

The maximum wholesale prices have been fixed at 34s. 9d., 34s., 30s. 2d. and 25s. 4d. per bag, respectively.

Consumers' prices have been fixed at 3d. per 3 lb., 3d. per 3 lb., 8d. per 3 lb., and 7d. per 3 lb., respectively, including delivery to consumer for quantities less than 150 lb. at a time.

Outside the controlled areas the maximum consumer's prices have been fixed at 8d. per 3 lb.

(See *Government Gazette Extraordinary* of 15 March 1946).

Maximum Prices of Eggs.

THE maximum wholesale and retail prices of eggs in the controlled areas, as fixed on 1 March 1946, have been further increased from 29 March 1946 by 7d. per dozen for each grade, except grade III mixed. The prices are now as follows:—

	MAXIMUM PRICE, PER DOZEN.	
	Wholesale.	Retail.
	s. d.	s. d.
Grade I—		
Extra large.....	3 10	4 2
Large.....	3 8	4 0
Medium.....	3 6	3 10
Small.....	3 4	3 8
Grade II—		
Large.....	3 6	3 10
Medium.....	3 4	3 8
Small.....	3 2	3 6
Grade III—		
Mixed.....	2 5	2 5

(See *Government Gazette Extraordinary* of 29 March 1946.)

CROPS AND MARKETS.

Index of Prices of Field Crops and Animal Products. (Basic period 1936-37 to 1938-39=100.)

SEASON (1 July to 30 June).	Summer cereals.	Winter cereals.	Hay.	Other field crops.	Pastoral products.	Dairy products.	Slaughter stock.	Poultry and poultry products.	Com- bined index.
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	
WEIGHTS.	19	13	2	3	34	6	17	6	100
1938-39.....	92	107	96	89	79	102	106	92	93
1939-40.....	86	107	77	95	115	105	106	89	103
1940-41.....	109	113	106	156	102	108	110	104	103
1941-42.....	121	134	143	203	102	131	134	145	123
1942-43.....	160	149	144	159	122	147	167	173	146
1943-44.....	169	172	137	212	122	154	182	204	157
1944-45.....	184	183	160	280	122	177	172	187	163
1945—									
January.....	184	183	177	250	122	159	173	206	163
February.....	184	183	171	235	122	180	171	225	164
March.....	184	183	182	245	122	180	171	237	165
April.....	184	183	173	246	122	180	169	263	166
May.....	199	183	173	287	122	184	163	272	170
June.....	199	183	190	320	123	184	170	262	172
July.....	199	183	191	315	118	210	175	210	170
August.....	199	183	191	333	118	210	179	180	169
September.....	199	183	187	372	118	210	183	165	170
October.....	199	183	189	383	118	210	187	165	171
November.....	199	190	194	379	118	204	187	173	172
December.....	199	190	194	341	117	204	183	202	172
1946—									
January.....	199	190	191	349	118	204	179	233	174
February.....	199	190	153	303	118	186	175	256	171
March.....	199	190	160	283	118	186	171	277	171

(a) Maize and kaffircorn.
(b) Wheat, oats and rye.
(c) Lucerne and teff hay.

(d) Potatoes, sweet potatoes,
onions and dried beans.
(e) Wool, mohair, hides and skins.

(f) Butterfat, cheese milk and
condensing milk.
(g) Cattle, sheep and pigs.
(h) Fowls, turkeys and eggs.

Average Prices of Onions and Sweet Potatoes on Municipal Markets.

SEASON (1 July to 30 June).	ONIONS (120 lb.).						Sweet Potatoes. (120 lb.).		
	Johannesburg.		Cape Town.	Pretoria.	Durban.				
	Trans- vaal.	Cape.	Cape.	Cape.	Local.	Cape.	Johan- burg. Table.	Durban.	Cape Town.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1938-39.....	3 3	8 10	7 4	7 10	8 6	9 6	5 7	4 8	5 3
1939-40.....	6 3	9 10	7 3	9 11	9 8	10 5	5 7	5 9	5 0
1940-41.....	12 5	12 3	9 10	11 11	11 2	12 7	7 3	6 4	5 5
1941-42.....	10 5	13 11	10 4	13 10	13 0	14 3	9 10	7 1	8 4
1942-43.....	13 8	14 0	12 6	14 7	12 9	14 5	9 8	8 1	8 5
1943-44.....	16 2	18 9	15 1	17 4	19 1	19 2	12 0	10 9	10 7
1944-45.....	14 7	18 7	14 8	18 1	18 8	19 5	17 3	15 1	16 3
1945—									
January.....	12 9	13 1	9 11	14 8	12 3	13 5	18 2	7 8	14 7
February.....	13 5	13 10	9 9	10 4	12 2	14 0	16 0	8 1	10 8
March.....	13 10	15 2	11 4	14 9	18 9	17 0	12 6	9 6	12 5
April.....	17 8	17 5	14 6	16 9	12 6	17 8	9 11	7 5	9 1
May.....	16 4	17 11	12 0	18 0	19 11	20 10	10 4	7 1	11 4
June.....	20 8	17 11	14 4	18 4	15 4	18 1	9 4	8 2	9 4
July.....	16 7	18 7	15 5	16 8	17 7	20 5	10 4	8 8	12 4
August.....	18 7	18 4	15 7	18 3	16 9	19 4	11 8	8 9	12 1
September.....	16 1	17 7	16 1	19 11	19 3	20 5	15 0	12 11	14 2
October.....	10 8	14 5	12 11	14 8	10 4	15 10	19 0	15 6	17 0
November.....	12 8	9 3	13 0	—	14 3	13 10	19 11	19 1	21 3
December.....	14 8	15 3	15 6	17 10	16 11	15 7	17 1	14 6	17 7
1946—									
January.....	12 0	12 1	9 7	—	11 7	13 0	17 1	15 6	17 3
February.....	12 3	13 8	11 1	13 1	15 2	9 11	17 3	10 3	17 2
March.....	11 4	12 4	9 9	12 10	12 9	13 5	18 5	14 8	14 8

Average Prices of Lucerne, Teff, Kaffircorn and Dry Beans.

SEASON AND MONTH (b).	LUCERNE (per 100 lb.).			Teff Johan- nesburg (a) 100 lb.	KAFFIRCORN in bags (200 lb.).		DRY BEANS (200 lb.) bags.		
	Johannesburg (a).		Cape Town 1st grade.		F.o.r. producers' stations.		Johannesburg (a).		
	Cape.	Trans- vaal.			K1.	K2.	Speckled Sugar.	Cow- peas.	Kid- ney.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1938-39.....	3 10	3 1	4 0	2 7	13 1	12 9	25 0	16 9	24 2
1939-40.....	3 0	2 5	3 4	2 6	8 8	9 4	21 11	13 11	21 2
1940-41.....	4 2	3 5	4 3	3 3	15 6	17 0	30 0	16 8	27 11
1941-42.....	5 7	5 2	5 8	4 7	18 10	19 6	32 10	19 8	28 3
1942-43.....	5 5	6 0	7 4	5 5	24 10	24 10	34 0	25 8	24 2
1943-44.....	5 4	5 6	7 3	4 5	21 0	21 7	49 6	29 11	32 1
1944-45.....	6 4	5 4	7 2	4 9	18 8	18 8	88 7	39 6	70 6
1945—									
January.....	7 3	5 7	7 3	4 1	23 1	23 1	118 8	45 11	98 2
February.....	7 0	6 9	7 6	—	22 0	22 0	122 3	45 3	95 3
March.....	7 2	5 10	7 3	5 5	22 0	22 0	107 0	42 11	89 3
April.....	6 10	—	7 8	5 2	22 0	22 0	109 11	53 4	104 8
May.....	6 9	5 7	7 6	5 5	20 6	20 6	111 1	61 7	97 1
June.....	7 6	6 9	7 9	5 8	20 6	20 6	102 2	67 11	95 2
July.....	7 6	—	7 9	5 9	20 6	20 6	105 8	67 1	80 10
August.....	7 6	—	7 9	5 9	20 6	20 6	93 7	66 3	80 7
September.....	7 4	—	7 9	5 9	20 6	20 6	87 0	67 2	74 8
October.....	7 5	7 6	7 0	5 9	20 6	20 6	91 2	70 8	63 3
November.....	7 6	6 9	7 3	6 6	20 6	20 6	106 3	68 7	79 1
December.....	7 6	—	7 3	—	20 6	20 6	104 3	61 7	69 6
1946—									
January.....	7 6	—	8 1	5 9	20 6	20 6	103 4	68 6	75 4
February.....	6 0	5 10	8 1	5 9	20 6	20 6	90 8	69 3	69 4
March.....	6 2	5 3	7 4	5 4	20 6	20 6	86 8	61 11	63 7

(a) Municipal Market.

(b) Seasonal year for kaffircorn,
1 June-31 May.

Dry Beans, 1 April-31 March;

Lucerne and teff, 1 July-30
June.

Average Prices of Green Beans, Green Peas and Carrots on Municipal Markets.

SEASON (1 July to 30 June.)	GREEN BEANS (Pocket 20 lb.).			GREEN PEAS (Pocket 20 lb.).			CARROTS (Bag). (a).		
	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1938-39.....	1 8	2 3	2 0	2 4	1 9	1 2	3 8	2 6	6 1
1940-41.....	1 11	2 9	1 5	2 8	2 4	2 3	5 9	4 11	13 4
1941-42.....	2 7	3 10	2 6	3 11	3 3	3 4	8 5	8 11	17 2
1942-43.....	3 1	4 3	3 0	3 3	2 10	3 9	5 1	8 9	13 2
1943-44.....	3 8	4 11	3 0	4 11	4 10	4 11	0 11	11 1	20 2
1944-45.....	3 7	5 1	4 1	4 9	4 1	5 5	8 3	9 11	19 10
1945—									
January.....	1 10	0 11	2 4	4 3	1 9	6 7	7 7	3 1	10 2
February.....	1 7	3 4	2 3	5 5	6 9	7 4	7 8	6 11	19 1
March.....	2 3	4 11	2 6	7 7	12 0	6 7	9 5	6 3	25 4
April.....	1 11	2 8	1 10	4 4	6 6	4 0	8 6	13 9	19 6
May.....	3 3	5 3	2 3	5 9	9 11	3 1	9 5	8 7	21 6
June.....	4 3	4 2	5 0	4 9	7 9	3 8	10 0	10 10	13 9
July.....	9 10	7 10	5 10	8 2	11 7	8 8	10 1	16 4	20 11
August.....	7 4	6 4	6 10	5 8	7 10	5 5	13 4	17 11	12 11
September.....	3 1	5 9	4 1	2 8	4 1	2 4	7 5	12 8	16 8
October.....	3 8	5 4	4 9	4 4	3 6	7 7	9 6	9 10	20 11
November.....	1 6	3 4	2 4	9 0	4 0	9 4	9 8	8 8	16 4
December.....	2 4	2 3	2 3	12 1	—	12 5	10 9	7 10	13 10
1946—									
January.....	3 4	1 11	5 6	8 8	10 11	14 7	9 8	6 2	16 0
February.....	1 11	—	2 3	6 5	—	8 4	7 3	7 11	14 1
March.....	2 10	1 1	2 5	6 1	—	3 4	8 10	8 1	23 10

(a) Weights of bags vary, but on the average are approximately as follows:—Johannesburg, 180 lb.; Cape
own, 90 lb.; and Durban, 120 lb.

CONTENTS



	PAGE
EDITORIAL:	
Food Production and Artificial Fertilizers	359
ANIMAL HUSBANDRY:	
Gammexane and D.D.T. Dips for Control of Arsenic-resistant Blue Tick (P. M. Bekker and H. Graf)	361
A Milking Shed and Dairy Buildings designed to meet Municipal Requirements (W. F. Bergh, J. W. Cleghorne and J. T. la G. Matthee)	369
Water for Stock in the Perennial Rainfall Coastal Belt (C. D. B. Liebenberg)	385
The Breeding Value of Friesland Bulls in South Africa. II (Dr. F. N. Bonsma)	390
Chicken-Pox (J. D. W. A. Coles)	407
Temperature of Milk on Arrival at the City Dairy (S. Bakalor)	143
Blowfly Spray for Sheep and Cattle	418
FIELD HUSBANDRY:	
Contour Planting of Vegetables (J. C. le Roux)	367
Rotational Cropping is Indispensable to Sowing-lands (S. W. Walters)	375
The Ploughing of Contoured Lands (N. J. van Straaten) ...	403
Egg-Plants Resistant to Bacterial Wilt (Dr. V. Wager)	410
MISCELLANEOUS:	
Preservation of Timber for the Farm (J. H. van Wyk)	377
Farming is a Business: IV. The Reward (O. E. Burger) ...	383
Sale of Stock	417
CROPS AND MARKETS	421

[NOTE.—Articles from *Farming in South Africa* may be published provided acknowledgment of source is given.]

FORD'S FOR SEEDS—A. FORD & Co. (Pty.,) Ltd. AGRICULTURAL SEEDSMEN.

SEED CONTRACTORS TO THE UNION GOVERNMENT,

P.O. BOX 5701.

CATALOGUES FREE

JOHANNESBURG.

G.P.-S.1385—1946-7—7,200.

Information on Departmental Publications.

Farming in South Africa, the monthly journal of the Department, contains popular as well as scientific articles on a variety of agricultural topics, useful to both the farmer and the housewife, while the Crops and Markets Section supplies information on crop prospects, market prices and exports of agricultural produce.

The following particulars in regard to subscriptions and advertisements should be noted.—

Subscription.—Within the Union, South West Africa, Bechuanaland Protectorate, Southern Rhodesia, Swaziland, Basutoland, Mocambique, Angola, Belgian Congo, and British Territories in Africa, 5s. (otherwise 7s. 6d.) per annum, post free, payable in advance.

Applications, with subscriptions, to be sent to the Government Printer, Bosman Street, Pretoria.

Advertisements.—*The Tariff for Classified Advertisements is:* 2d. (two pence) a word with a minimum of 5s. per advertisement (prepaid). Repeats, not entailing any change in the wording, will be published at half the cost of the original.

Conditions:

- (1) The advertisement will be classified under specific headings, and only one black letter (initial letter) is permitted.
- (2) Advertisements in which prices are mentioned must contain the name and address of the advertiser. A nom-de-plume or box number only is not sufficient, and unless this condition is strictly observed, advertisements will not be accepted.
- (3) Advertisements will be classified strictly in accordance with the subject-matter of the announcement, determined by the first item mentioned and cannot be inserted under irrelevant headings.
- (4) Displayed, classified advertisements will also be accepted. The charge, however, will be 10s. per inch, single column, per insertion, without reduction for repeats.

Copy for Advertisements to be in the hands of the Government Printer, Pretoria, not later than the 20th of the month preceding publication.

Send all advertisements direct to the Government Printer, or write to him for details as to tariff for advertisements.

Popular Bulletins.—Bulletins on various agricultural topics are published by the Department to meet public demand. A list of available bulletins giving particulars of cost, etc., is obtainable free of charge from the Editor, Department of Agriculture, Pretoria.

Scientific Publications.—From time to time the different Divisions of the Department issue science bulletins incorporating the results of research work conducted by them. Other scientific publications issued are: "The Onderstepoort Journal", "Memoirs of the Botanical Survey of South Africa", "Bothalia", "Entomological Memoirs" and the "Annual Reports of the Low Temperature Research Institute". Information in regard to these publications is obtainable from the Editor, Department of Agriculture, Pretoria.

Press Service.—The Press of South Africa is now supplied with a bulletin of agricultural information for their exclusive use. This information is supplied to all newspapers and other journals throughout the country.

Farmer's Radio Service.—In addition to the printed information supplied by the Department to members of the farming community, the Department, in collaboration with the South African Broadcasting Corporation, also has a national broadcasting service for farmers. Information in regard to times of broadcasting is contained in the programmes issued by the Broadcasting Corporation.

Inquiries.—All general inquiries in regard to the above should be addressed to the Editor, Department of Agriculture, Pretoria.

D. J. SEYMORE, Editor.

FARMING IN SOUTH ... AFRICA

VOL. 21

JUNE 1946

No. 243

Editorial:

Food Production and Artificial Fertilizers.

AFTER an unprecedented, destructive war, the world is to-day threatened with famine. The production and distribution of food remain the main topics of national and international deliberations and negotiations. Even a country like South Africa, which up to a few years ago was burdened with surpluses and subsidized export, to-day hardly knows how it is going to manage until the next crop. In this connection we think of wheat and maize, the basic crops for the feeding of man and beast.

The authorities have therefore been compelled to impose certain restrictions on the consumer, to ensure that what remains of our supplies, together with possible additions from imports, will provide for the country's needs until the following harvest. On the other hand, it is of the utmost importance that our crops should be as large and stable as possible, and here it is only the farmer who, as primary producer, can and must make the necessary provision.

To-day, in contrast with the past, the farmer also has a sense of security in the knowledge that this demand for food is not merely a temporary phase. Trade and industry are making rapid strides ahead and it is hardly likely that the needs of South Africa will be met for at least another few years. Even if this were to happen, any surplus would be no more than a drop in the ocean of world requirements.

In comparison with other parts of the world, South Africa has not been endowed with very fertile soil, and that which has already been cultivated has unfortunately deteriorated rather than improved. According to statistics, the average grain yield per morgen in South Africa is the lowest in the world. This can partly be ascribed to the extensive nature of our farming. Nevertheless, it must be admitted that there is still much scope for large-scale improvements. Proof of such possibilities are to be found not only at the numerous experiment stations of the Department, but fortunately also on the farms of many progressive farmers.

The maintenance or improvement of the fertility of the production capacity of the soil is dependent on the natural powers of recovery of the soil when under cultivation and on the extent to which natural manure and/or artificial fertilizers are used. Manure or fertilizers were unknown to primitive agriculture; good soil, such as that along the Nile River, retains a remarkable production capacity, but less fertile soil soon deteriorates with resultant progressive overcropping. The greater part of the ten per cent. of South Africa's arable soil is sooner or later reduced to a relatively low level of production, but by the judicious use of manure and artificial

fertilizers, as well as the application of more up-to-date agricultural methods, much can be done towards increasing production.

Owing to war conditions, sufficient fertilizers are difficult to obtain at present, and the demand cannot be met. There is a world shortage of phosphatic fertilizers and the Union's allotment is barely 40 to 50 per cent. of the actual requirements.

We must therefore exert ourselves more than ever before, to utilize our natural resources as profitably as possible. Farmers are urged to use their quota of fertilizers, especially of phosphates, to supplement all available farm and kraal manure, compost, etc. Generally speaking, crops cultivated under irrigation, require much more nitrogenous fertilizer than dryland crops, with the exception of course of dryland potato crops. Moreover, the fertilizer requirements of various crops differ. Wheat, for example, requires more nitrogen in the form of manure, etc., even under dryland conditions, than, say, maize. It is true that the fertilizer shortage is hampering optimum production, but in some circles this fact is not only exaggerated, but even used as an excuse for a degree of slackness. In such cases matters will not be improved by the application of additional fertilizer over and above the minimum economic requirements of the crop.

A high level of food production cannot be obtained by the use of artificial fertilizers only. In certain circumstances, artificial fertilizer is a wholly subsidiary item. It may generally be assumed that soil which is well treated with the small quantity of fertilizer which is usually allotted, will yield reasonable crops provided the farmer pays the necessary attention to the numerous other important factors, such as proper cultivation of the soil and efficacious weed control. If less plant food than usual is present in the soil, competition by weeds will be tolerated even less. Proper spacing and suitable rate of seeding make it possible for the best use to be made of the available moisture in the soil, and a little extra trouble to obtain the best seed of those varieties which thrive well, will be amply rewarded. Let us therefore not be found wanting in our efforts at increased food production. Apply to the Department, the College of Agriculture or the Regional Officer for assistance, guidance and advice in your own interest as well as that of your country.

A Genetic Study of Sorghum Relationships.

THIS science bulletin, No. 242, by F. X. Laubscher of the Potchefstroom College of Agriculture, is a study of the inheritance of various sorghum characters which give an indication of the degree of relationship between the respective parents. The data obtained in this manner are interpreted in the light of current opinions on the botanical relationship between different groups of this genus. The bulletin is obtainable from the above-mentioned Institution at 3d. per copy.

Gammexane and D.D.T. Dips for Control of Arsenic-Resistant Blue Tick.

P. M. Bekker and H. Graf, Division of Veterinary Services, Onderstepoort.

DUE to the interest taken by the farming community in the dipping experiments now being carried out in the East London area, it was deemed advisable to publish a preliminary report containing the results collected up to the present. It must be understood that this report is necessarily incomplete and that a more detailed report will appear after conclusion of the experiments which may still continue for several months.

As has already been indicated in several previous articles (1-4), there has appeared in the East London area a new strain of the blue tick, *Boophilus decoloratus*, which, without any change in its outward appearance and life-cycle, could not be effectively controlled by means of arsenical dips.

As far as can be ascertained, this tick first appeared in May 1937 on a farm near Berlin, 25 miles from East London, and in March 1938 on a farm in the Komgha district.

The tick rapidly multiplied and first spread in the East London area until by 1939 and the beginning of 1940 it had become a general problem.

At present it is prevalent in practically the whole coastal belt from Alexandria in the south up to the most northerly coastal areas of Natal and Zululand. The tick only made its first appearance near Port Shepstone a few years after becoming a pest near East London. From here, however, the spread through Natal was apparently accelerated, possibly as a result of the freer movement of cattle than in the Transkei and the spread of tick-infested animals sold at auctions.

It is difficult to prophesy how far the tick will spread to the interior. There are indications that the infested area in northern Natal is somewhat wider than that in the Transkei. Thus, for example, the tick is found in the Vryheid and adjoining districts as far as 80 to 100 miles from the coast.

It must be stressed that it is only in this roughly outlined belt that the blue tick can no longer be effectively controlled by means of arsenical dips in contrast to the rest of the country where the arsenical dips are still quite effective. The presence or absence of this tick can be determined only by means of regular dipping over an adequate period, or by means of laboratory tests.

Extensive experiments were carried out in 1940-1941 in the area in question (East London) to find an effective dip against this tick. In these experiments various dipping mixtures were tested, e.g. paraffin emulsions, coal-tar dips, soft soap, copper sulphate and nicotine, all as additions in varying proportions to the ordinary arsenical dip washes. Further, dipping in increased concentrations of arsenic with shorter intervals than the usual weekly one were tried without any success.

From these experiments it emerged that this tick can, however, be effectively destroyed by the use of a seven-day arsenical dipwash

to which nicotine has been added to give a strength of not less than 0.04 per cent., provided regular weekly dipping is resorted to. Even then the tick does not disappear immediately; the animals may only be free from fully engorged ticks after the seventh dipping. In long-haired cattle some ticks may even then still be found. These have escaped the effect of the dip, and make their appearance as engorged adults.

To enable the farmer to utilize the nicotine from waste tobacco (2), or from tobacco specially grown for this purpose (3), a method was developed by which the nicotine could be leached directly in the dipping tank.

A very important practical consideration is the extent to which the dipping material retains its efficacy in the tank. As regards the stability of nicotine it was found that the presence of arsenic prevented the nicotine from decomposition, so that it retained its effectiveness even after several months.

In view of the fact that several preparations have been tested out and found to be of little value, farmers are advised to consult the Director of Veterinary Services, Onderstepoort, before incurring unnecessary expense by using any untried lay recipes.

The New Insecticides.

As is to be expected, the Division was only too eager to test out at the first available opportunity any new promising insecticides. The fact that nicotine has become practically unobtainable, coupled with the increased spread of the blue tick, made this even more essential. During the war, two substances in particular drew much attention owing to their remarkable insecticidal properties, viz:—

(1) Para-para-Dichloro-Diphenyl-Trichlorethane, popularly known as D.D.T.

(2) The *gamma* isomer of hexachloro-cyclo-hexane, popularly known as gammexane or 666. The latter designation is derived from the fact that chemically this substance is composed of 6 carbon, 6 hydrogen and 6 chlorine atoms.

The Government C.D. factory at Klipfontein placed sufficient quantities of both D.D.T. and gammexane at the disposal of the Veterinary Division for testing purposes.

Since both substances are insoluble in water, the first essential was to prepare suitable emulsions, which would keep well not only in the concentrated form but also when diluted with varying types of natural waters and in the presence of arsenic.

After some effort an emulsion was prepared which met all these requirements and which possessed the further advantage that in the diluted form it did not tend to float on the surface of the dip. This would have tended to promote evaporation of the volatile solvent, with deleterious effects.

The nature of the emulsion, the solvents, emulsificants and preservatives used do not fall within the scope of this short report. It is sufficient to state that D.D.T. concentrate contained at first 25 per cent. and thereafter 20 per cent. of the active para-para isomer. In respect to gammexane it was assumed that the technical product contained 10 per cent. of the active *gamma* isomer. On this basis, therefore, the concentrate contained at first 1.25 per cent. and later 1 per cent. of the active isomer.

Preliminary laboratory tests and previous experience with nicotine as dip, indicated that a strength of 0·5 per cent., i.e. a dilution of 1 gallon of the 25 per cent. concentrate per 50 gallons tank fluid, seemed a reasonable strength to start off with. With regard to gammexane, it was assumed, from available literature, to be 100 times more effective than D.D.T. The first tank, therefore, was diluted down to a 0·005 per cent. gamma isomer concentration, i.e. 1 gallon of the 1·25 per cent. emulsion per 250 gallons dipwash.

(1) D.D.T. Emulsions in Dipping Tanks.

A number of tanks containing varying dilutions of D.D.T. were employed, but in this preliminary communication only some will be referred to.

(a) Tank No. 1.

This tank contained 0·5 per cent. D.D.T. (active isomer), without additional arsenic. This strength apparently had an irritating effect on stock which for the first few minutes after dipping were somewhat restless and showed salivation. These effects are very similar to those obtained with the nicotine dip, except that the latter's smarting effect on the eyes was absent. The restlessness, however, rapidly disappeared and after about 10 minutes the animals started to ruminate or to feed.

The effects mentioned above might quite possibly be due to the special solvent used, and experiments will be conducted with emulsions of the solvent alone, to clarify the position.

After the second dipping the effects were less noticeable and on subsequent dippings were quite absent. The animals thus soon accustomed themselves to this new dip.

This was, however, not the case with the hornfly (*Lyperosa irritans*)! With the first dipping this fly was present in large numbers and assumed the proportions of a real pest. It could readily be observed, however, that the flies already started dying whilst the animals were still standing in the draining pen. With the second dipping the flies had become much less numerous, and after that were quite absent.

(i) *Effect on ticks*.—The tick infestation on this herd was a heavy one, and after the first dipping a fair number of fully engorged ticks were still present. Twenty of these were removed and placed in separate test-tubes containing blotting paper to absorb any moisture; 6 of these died, 5 laid very few eggs and the other 9 a moderate amount of eggs. Of these eggs, however, even after 10 weeks, only 6 groups had hatched as compared with the controls, i.e. ticks which had not been in contact with the dip, and which had all hatched several weeks before.

With the second dipping, occasional semi-engorged ticks were still present on the animals, but on the day after dipping none could be found. This was still the case 3 days later, when not even a single larval stage could be detected. During the further duration of the experiment the farmer could only find a single engorged female on the whole herd.

(ii) *Resistance to Re-infestation*.—Prior to the third dipping, 10 animals were marked and omitted from dipping. Only 35 days after their last dipping could the first fully engorged ticks be detected

on them again. In view of the fact that this tick may reach the fully engorged adult stage in 23 days, it would appear that this concentration protects the animal from reinfestation for about 12 days. The red tick, *Rhipicephalus evertsi*, the only other species present, was also controlled by this dip. It did not, however, prevent reinfestation with the adult stage within 24 hours. (This tick is a 2-host species.)

(iii) *Stability of D.D.T.*—The emulsion used kept well, but a portion apparently precipitated, since the strength gradually decreased. After 9 weeks, some of the D.D.T. floated on the surface. No D.D.T. concentrate, but only water, is being added to the tank, with a view to determining the minimum concentration which would still, with dipping at 7-day intervals, effectively control the tick.

(b) Tank No. 2.

In this case 0.1 per cent. D.D.T. (i.e. $\frac{1}{10}$ the strength of that in the previous case) in 7-day strength arsenical dipwash was used. Tick infestation was exceptionally heavy; hundreds of engorged ticks could be seen on a single animal.

(i) *Effect on Ticks.*—Although it was evident after the first dipping that this concentration affected the tick badly, individual ticks could nevertheless still be found at the fourth dipping. They, however, easily ruptured on removal, an indication that they were affected by the dip. After the fourth dipping the presence of engorged ticks was exceptional.

(ii) *Resistance to Re-infestation.*—In contrast to the previous case, this strength offered virtually no protection to re-infestation since the omission of a single dipping, due to unfavourable weather, resulted in the appearance later of individual mature ticks after 23 days.

(iii) *Stability of D.D.T.*—The D.D.T. in this tank, after nine weeks, is still present as a perfect emulsion, this being in direct contrast to the first tank in which the five times stronger emulsion, in the absence of arsenic, showed a certain amount of decomposition after 10 weeks. The presence of the arsenic would appear to exert a preservative action on the emulsion.

With this strength of D.D.T., no ill effects could be noticed on the animals.

(c) Tank No. 3.

In this case 0.05 per cent. D.D.T. (i.e. $\frac{1}{20}$ the strength used in case 1) and 7-day arsenical dipwash was used.

(i) *Effect on Ticks.*—Even at this dilution the D.D.T. undoubtedly has an effect on the tick. There was, however, after the fifth dipping, a fair number of ticks still on the animals, and it is doubtful whether this strength is practical. Further experiments in this connection are in progress.

The possibility that this slow effect on the tick may be due to partial decomposition of the D.D.T. itself must not be ignored.

Conclusions on the use of D.D.T.

From the above experiments it is evident:—

(1) That a strength of 0.1 per cent. D.D.T. (active isomer), and over, effectively controls this tick;

(2) that 0·5 per cent. also effectively controls the hornfly; and

(3) that the protection afforded by D.D.T. to re-infestation by the tick is of short duration.

(2) Gammexane Emulsions in Dipping Tanks.

At present, 8 tanks containing gammexane are in use. Of these, four contain, in addition, arsenical dipwash. The testing out of gammexane will have to be continued for quite a while yet, and the addition of more tanks has already been planned. Not all the tanks now in use will, however, be referred to here, but only some will be briefly discussed.

(a) Tank No. 1.

This tank contained 0·005 per cent. of the active isomer of gammexane and, in addition, 7-day arsenical dipwash. The tick infestation here was a very heavy one.

(i) *Effect on the Tick.*—A very marked effect was already noticeable 24 hours after the first dipping. All the larval and nymphal stages had been killed off, and only exceptional adult engorged ticks were still alive. On the day of the second dipping not a single live tick could be found on any of the 30 stabled cows, which had all been very heavily infested. Although an occasional adult engorged tick could still be detected after this, the animals were absolutely free of ticks after the fourth dipping.

(ii) *Resistance to Re-infestation.*—The resistance, if any, afforded by gammexane to re-infestation by the tick was of no practical value, and it is evident that, with this dip, weekly dipping will have to be undertaken to control the tick effectively.

(iii) *Stability of Gammexane.*—In the presence of the arsenic no marked decomposition of the emulsion was noticeable, and after 12 weeks it appeared as good as at the start.

(iv) *Effect on Egg-laying Ability of Dipped Ticks.*—Here, as was the case in all the other experiments, adult engorged females, which had been through the dip, and also those which had not (controls), were collected. This was done to determine to what extent, if any, the dip affected the egg-laying ability of the ticks, as well as the subsequently hatching of these eggs. The time between removal and egg-laying, the amount of eggs laid and the time taken for them to hatch were recorded.

In this case there was a marked decrease in the amount of eggs laid, and even after eleven weeks none had hatched as compared with the controls which had hatched several weeks previously. Not only was there thus a decrease in the number of eggs laid, but also a definite delay in hatching and even possibly a total infertility caused by the action of this dip. The latter fact is naturally of vast importance in tick eradication.

(v) *Effect on the Animals.*—No harmful effects on the animals were noticed at the time of dipping or subsequently.

(vi) *Effect on Milk Production.*—No greater decrease in milk production than that usually caused by arsenical dipwashes alone, could be detected.

(vii) *Effect on the Hornfly*.—In contrast to D.D.T., gammexane has no striking effect on the hornfly.

(b) Tank No. 2.

Here a concentration of 0.0025 per cent. gammexane (active isomer) without additional arsenic was employed. The strength is thus equivalent to half of that used in the first tank. Here also the tick infestation was a severe one.

(i) *Effects Achieved*.—Five days after the first dipping most of the immature stages were dead and dried out. After the second and third dipping, however, engorged adults were again recorded, but many of these were affected by the dip, as was evidenced by the ready rupturing on removal from the animals.

With the fourth dipping there were signs that the dip was decomposing, with a resultant decrease in its efficacy. Due to this fact, no definite conclusions could be drawn as to its proper value as a dip. This also goes to show that the question of the stability of this type of organic dip is an important one which needs further investigation. The chances are that a definite amount of arsenic will be an essential addition as a preservative, as is the case with nicotine-arsenic dips.

(c) Tank No. 3.

In this case a strength of 0.001 per cent. gamma isomer was employed, i.e. $\frac{1}{5}$ of the strength used in the 1st tank, and again without the addition of arsenic.

(i) *Effects Achieved*.—It was found that after the second dipping any amount of dried up (dead) immature ticks were present and very few live adults, and after the third dipping some engorged larvae and adults but few nymphae, which all showed signs of being affected by the dip. At this stage the emulsion was found to decompose, resulting in the ticks increasing again after the fifth dipping; some of these, however, still showed signs of being affected by the dip.

Conclusions on use of Gammexane.

It is evident that gammexane emulsions in a strength of 0.005 per cent. as gamma isomer, in the presence of arsenical dipwashes, or without it, can control the arsenic resistant blue tick with 100 per cent. success.

The question as to whether arsenic is an essential addition as a preservative for the emulsions can as yet not be answered. The indications are that without arsenic changes may take place in the dipping tank, but whether such changes are due to the decomposition of the gammexane itself or the emulsion alone, can only be clarified on further investigation.

Since gammexane can be used at such low concentration, it should be able to compete with the existing stock dips on an economical basis. Much will, however, depend on its stability over long periods.

A definite drawback at present is the absence of a testing method to control the actual strength in the dipping tank.

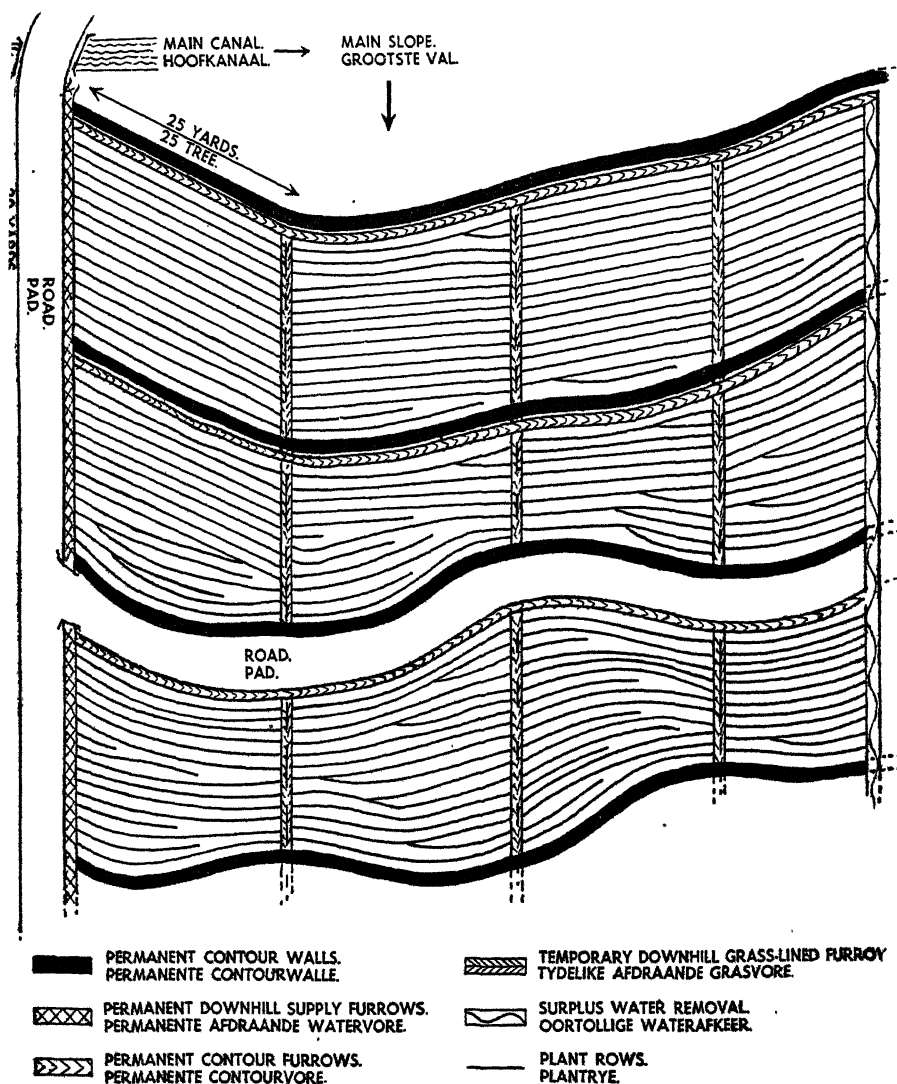
Questions for Investigation.

Finally, although there is no doubt that both D.D.T. and gammexane can destroy the arsenic-resistant blue tick, much work will still have to be done before any definite recommendations can be made as to its use as a stock dip.

Contour Planting of Vegetables.

J. C. le Roux, Senior Horticulturist, Subtropical Horticultural Research Station, Nelspruit.

THE importance of contour planting as a means of preventing soil erosion and making efficient irrigation possible is undoubtedly recognized by many farmers. Unfortunately, wrong methods are often adopted because growers do not know how to set about matters. A description of the actual method to be followed in planting vegetable crops along proper contours should therefore be of considerable interest and help to farmers.



DIAGRAMMATIC REPRESENTATION OF CONTOUR LAYOUT
SKEMATIESE VOORSTELLING VAN CONTOURAAANLEG.

It is essential that all sloping lands, especially where intensive farming under irrigation is practised, should be properly provided with permanent contours for the removal of storm and surplus irrigation water. Information on the subject and assistance in establishing such contours can be obtained on application from the Division of Soil Conservation.

The object of this article is to describe a practical method of establishing the position of, and drawing, the planting furrow for crops to be grown under irrigation.

To begin with, the land should be ploughed and properly prepared by harrowing or discing. At the highest point of the land situated just below the main irrigation canal or the top permanent contour, a point is taken and a stake driven in. From this point stakes are set about every five yards, in a straight line down the slope at the end of the land. From each of these points "contour" lines with a fall of approximately four to six inches per 100 feet are staked right across the prepared land.

By means of a small reversible mouldboard plough, planting furrows are then drawn along these contour lines, the plough being set to turn the soil downwards in the direction of the slope. With these original furrows as guides, the furrowing of the sections between them is then completed in the following manner: The first additional furrow is drawn about four feet below the top guiding furrow, followed by a second one about four feet above the second guiding furrow. In between these four furrows additional long or short furrows are then fitted in to the best advantage. Where the strips become too narrow for a further furrow it is omitted, with the additional short furrow starting only where the strip becomes wide enough to take it. Should the remaining strip be unnecessarily wide for one additional short furrow, more such furrows can be fitted in. In a similar manner the furrowing of all the remaining sections is completed.

After this, manure and fertilizer are applied and mixed with the soil in the furrows by means of a cultivator which has been set narrow for the purpose. At this stage the land is ready for the plants to be set in the planting furrows, except that the irrigation supply furrows have still to be made.

Below the wall and following each permanent contour a permanent irrigation furrow is drawn. These supply the downhill grass-lined furrows to be established to run parallel to one another down the slope about 20 yards apart, the actual length of run (that is the distance between downhill grass-lined furrows) being determined by factors such as soil texture, type of crop and drainage.

Further advice which may be required on the subject, and details of simple inexpensive instruments for staking out contours will be supplied by the author on application. The accompanying diagrammatic representation of a contour lay-out is taken from the Department of Agriculture's Bulletin No. 255, "Vegetable Production in South Africa", which is obtainable from the Editor of Publications, Pretoria, at 1s. per copy.

A Milking Shed and Dairy Buildings designed to meet Municipal Requirements.

W. F. Bergh and J. W. Cleghorne, Senior Professional Officers,
and J. F. la G. Matthee, Assistant Professional Officer,
Division of Soil Conservation and Extension.

THERE is an increasing demand for plans of a milking shed and accessory dairy buildings, which will comply with the by-laws governing the delivery of fresh milk in municipal areas.

In order to meet this demand, the writers have, in co-operation with the Veterinary Officer of the Municipality of Pretoria, drawn up the following plans for an effective milking shed, dairy, wash-up room, boiler room, etc. If the plan is carefully followed when erecting these buildings, the requirements of the City Council will be met as far as the delivery of milk in municipal areas is concerned.

The requirements are shortly as follows:—

A. The Milking Shed.

(1) This building must be at least 100 yards from the nearest pig-sty.

(2) Some municipalities stipulate that the dairy must be between 30 and 50 feet from the milking shed. In these plans, however, the two buildings are not separated, but the Municipality of Pretoria is satisfied with the new arrangement in which, although the dairy is attached to the milking shed, there is no direct access from the one to the other.

(3) The walls of the shed must be easily washable.

(4) *Ventilation*.—In addition to the doors, there must be ventilators of at least 3 sq. feet per cow, and openings of the same size to provide for the escape of stale air.

(4) *Light*.—Openings of three square feet per cow are necessary. If milking is to take place at night, provision must be made for the necessary artificial lighting.

(6) *Air and floor space*.—In closed stables, each cow should have at least 600 cub. feet of air space and 45 cub. feet of floor space.

(7) *Slope of floor*.—The floor must have a slope of at least one inch from the manger to the manure channel, and the passage-way between the two channels must have a slope of one inch from its centre line to the channels.

(8) *Height of walls*.—The average height of the walls of the shed must be at least 10 feet.

(9) *The fodder passage* between the manger and the wall must be from $2\frac{1}{2}$ to 3 feet wide.

(10) *Width of manger*— $2\frac{1}{2}$ feet from edge to edge.

(11) *Stalls for cows*— $4\frac{1}{2}$ to 5 feet (from manger to manure channel).

(12) *Width of stalls*— $3\frac{1}{2}$ feet.

(13) *Width of central passage*— $5\frac{1}{2}$ feet.

(14) The central passage must be at least 2 inches lower than the stalls.

(15) *Manger*—height at least $2\frac{1}{2}$ to 3 feet at the back and at least 8 inches in front.

(16) *Slope of floor of shed*—at least 1 inch in 7 feet in the length of the building towards the outlet.

(17) Partitions between stalls must be of metal.

(18) *Floors*.—Cement, concrete, asphalt, or hard brick or stone joined with cement.

(19) The walls must be plastered on the inside so that they may be washed. They must be white-washed.

(20) Water must be laid on in pipes to the shed.

(21) A shower must be installed for natives. For washing purposes a tap will be sufficient for natives, since a basin is inclined to collect dirt.

B. Water Supply.

Most municipalities are very strict as regards the source of the water used in a dairy. Bore-hole water is preferred, since the chances of contamination are very small. Water from a well may be allowed, provided the well is sealed and the water meets all the requirements on analysis.

Fountain water may also be used, provided the municipal inspector concerned is satisfied that it is not exposed to any source of contamination. Such fountain water, like well-water, will naturally also be subjected to bacteriological and other tests.

C. Wash-up Room.

(1) This room must be at least 12 feet by 12 feet by 10 feet high.

(2) The walls must be smoothly plastered and washable.

(3) A suitable steam sterilizer must be provided.

(4) Hot water, or preferably steam, should be laid on.

(5) Two metal wash-basins should be provided, but should not be built in or cemented to the floor.

(6) Metal racks must be provided for the storing of all cans, milk-pails, etc.

(7) Water must be laid on.

D. The Dairy.

(1) The minimum size of this room is 12 feet by 12 feet by 10 feet.

(2) The walls must be smoothly plastered and painted with oil paint.

(3) The ceiling must be dust-proof and painted with oil paint.

(4) The floor, like that of the shed, should preferably be of cement concrete.

(5) Only tables with slab and legs of brickwork or cement are allowed.

(6) Provision must be made for sufficient light and air, and for glass windows which can be opened and whose area is at least $\frac{1}{12}$ that of the floor.

(7) All windows must be covered with gauze. In addition to the ordinary dust-proof wooden doors, a spring-operated gauze door is essential.

E. Site.

It is recommended that the shed be built to lie north-south in length, thus admitting a maximum amount of sunlight.

F. Size.

The shed must be large enough to allow the milking of the whole herd to take place in not more than two sessions.

Explanation of Plans.

Fig. 1 is a section through E.F. in *Fig. 2*. "A" is the milking stable, 30 feet in width, with a length to suit requirements. "B" is the milk-room or dairy which is 12 feet in length and 11 feet in width. "C" is the wash-up room whose lengths are 15 feet and 9 feet 3 inches and whose widths are 12 feet and 6 feet 3 inches. "D" is the 5 foot square boiler room. "E" is the feed room, 26 feet 9 inches in length and 11 feet in width. "F" is a passage 5 feet 6 inches wide.

Fig. 2 is a section through A.B. in *Fig. 1*.

Fig. 3 is a section through C.D. in *Fig. 1*.

Fig. 4 is a partial section through G.H. in *Fig. 1*, showing a steam supply (dotted) and a hot water supply.

Fig. 5 is a section showing the opening for the passage of cans from B. to C.

Fig. 6 is an enlarged view of the funnel, the strainer and the pipe through which the milk flows from A. to B.

Fig. 7 is an enlarged section through the can racks.

Nos. 1 in *Figs. 1* and *2* are the feeding passage, 2 feet 6 inches wide, with a fall lengthwise of 1 inch in 7 feet.

Nos. 2 in *Fig. 1* are the transverse passages with falls towards the manure channels of 1 inch in 5 feet.

Nos. 3 in *Figs. 1* and *2* are the outer manger walls, 3 feet in height and 4 inches thick at the top.

Nos. 4 in *Figs. 1* and *2* are the mangers having maximum internal widths of 2 feet 6 inches.

No. 5 in *Figs. 1* and *2* is the manger wall next to the cow, which is 8 inches high.

Nos. 6 in *Figs. 1* and *2* are the stalls which are 3 feet 6 inches wide and 4 feet 10 inches long, with a slope of 1 inch towards the manure channels.

Nos. 7 in *Figs. 1* and *2* are the manure channels having a width of 1 foot 6 inches with depths of 7 inches on the stall side and 4 inches on the passage side, with a fall crosswise of 1 inch, and a fall lengthwise of 1 inch in 7 feet.

No. 8 in *Figs. 1* and *2* is the milking and cleaning passage, 6 feet wide, with 1 inch slope from the middle to the manure channels.

Nos. 9 in *Figs. 1* and *2* are uprights of piping or wood.

Nos. 10 in *Figs. 1* and *2* are the stall divisions whose heights are 3 feet and 2 feet, with a length of 3 feet.

No. 11 in *Figs. 1* and *2* shows the steps, and the concrete slab of the platform, 5 feet high, which extends through the wall into the milk room to support the receiving pan (*No. 15* in *Fig. 3*.)

No. 12 in *Figs. 1, 2* and *6* shows the strainer and tinned metal funnel.

No. 13 in *Figs. 1* and *2* indicates the shower, piping and tap for use by the milkers.

No. 14 in *Figs. 1* and *2* is the door of stable type.

No. 15 in *Figs. 1* and *3* is the receiving pan on a concrete slab (see *No. 11*).

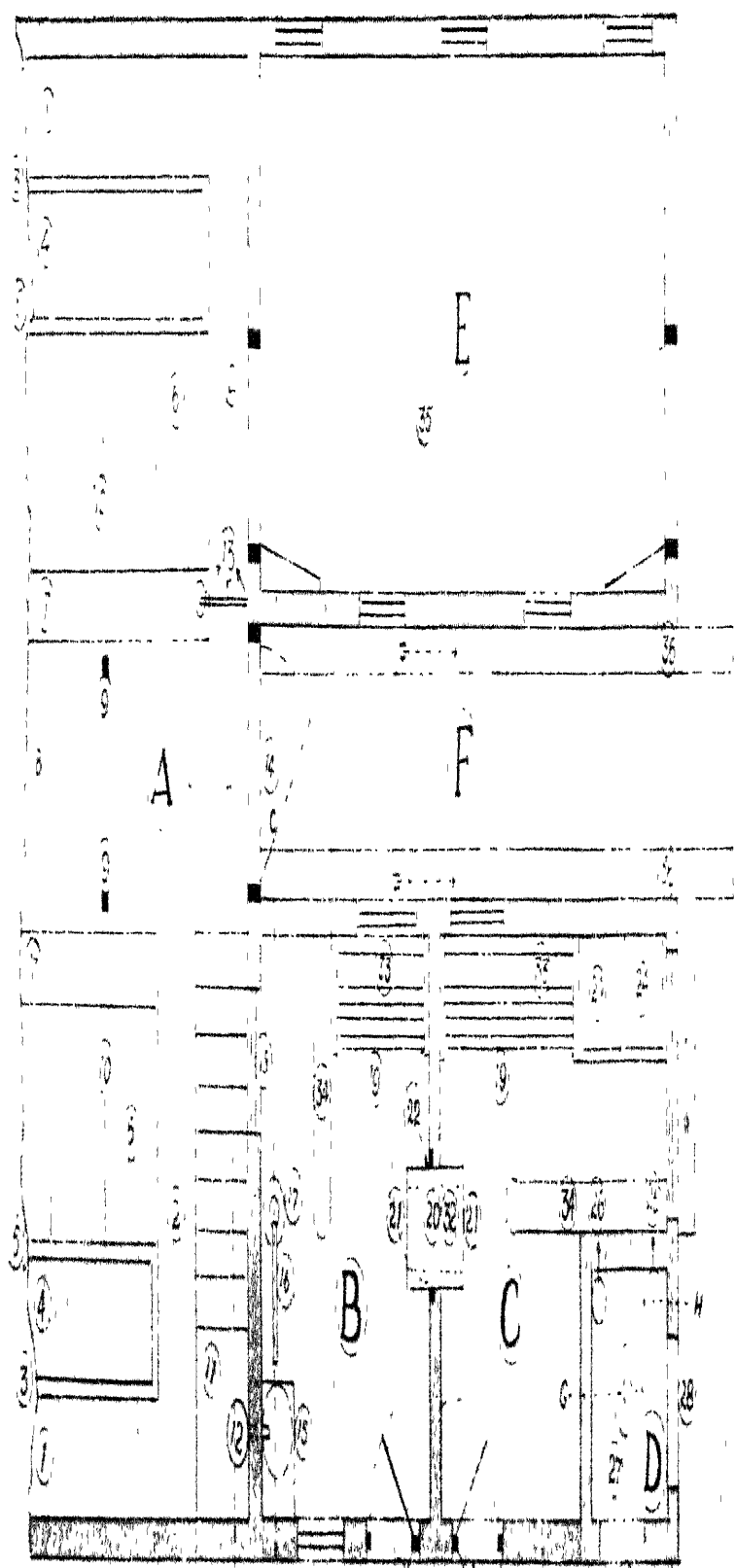


Fig. 1

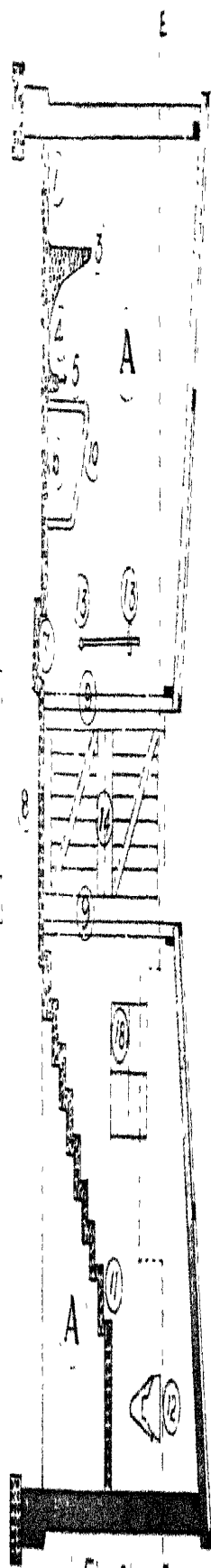


Fig. 2



Fig. 4

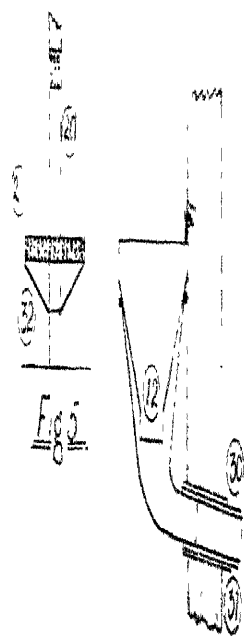


Fig. 6

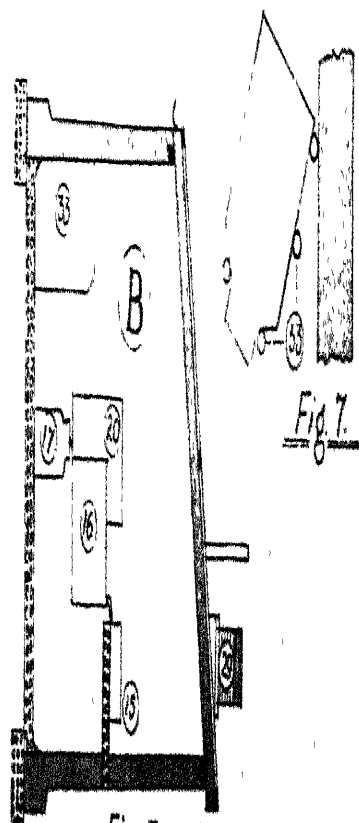
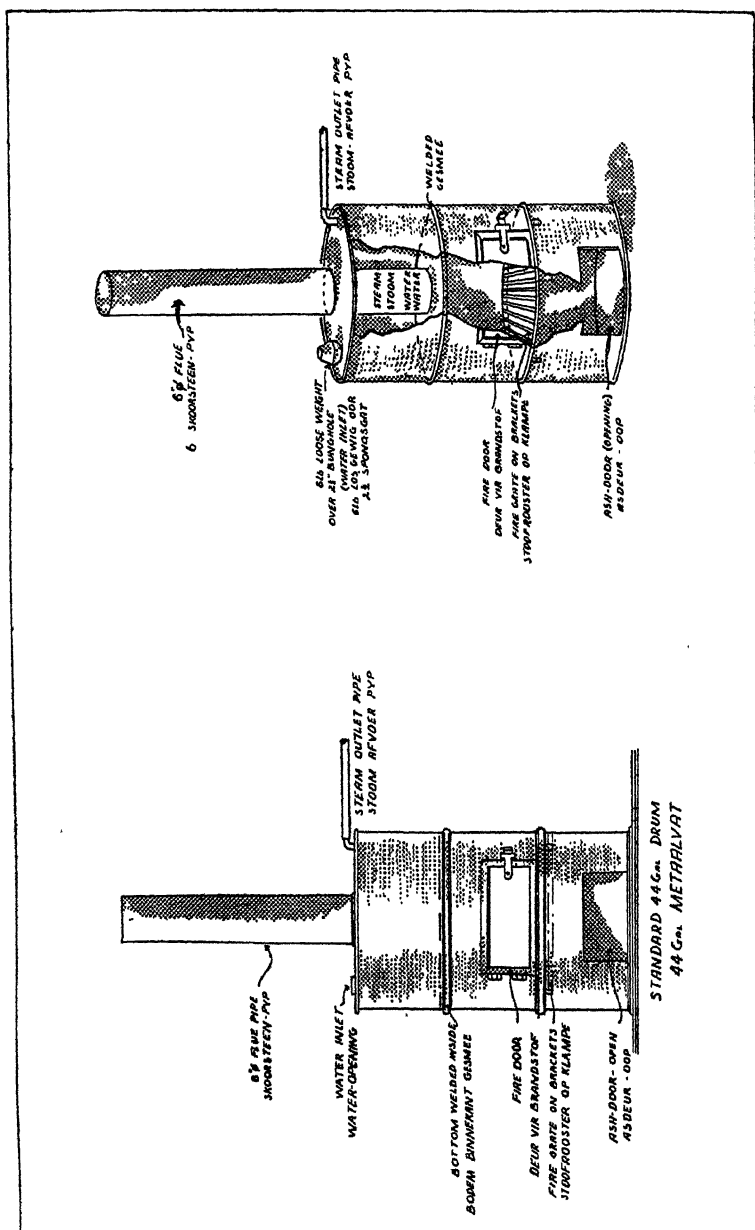


Fig. 7

No. 16 in Figs. 1 and 3 is the cooler, which in this case is 2 feet 4 inches in height and is attached to the wall.

No. 17 in Figs. 1 and 3 is a milk-can, 2 feet 2 inches high.



Sketch of Boiler.

No. 18 in Figs. 1 and 2 is the inspection window which cannot be opened.

No. 19 in Figs. 1 and 7 shows the can and utensil drying racks, the lowest pipe of which should not be less than 2 feet above the floor.

A MILKING SHED AND DAIRY BUILDINGS.

No. 20 in Figs. 1, 3 and 5 is an opening for passing cans. It is 3 feet high and 2 feet 6 inches wide.

No. 21 in Figs. 1 and 5 is a concrete slab extending 1 foot 6 inches into B. and C. and is 2 feet 6 inches above floor level.

No. 22 in Fig. 1 is a hinged (or sliding) door to close the opening.

Nos. 23 in Fig. 1 are gauze-covered doors, with gauze of 256 meshes per square inch, reinforced with $\frac{1}{2}$ -inch mesh wire netting.

Nos. 24 in Fig. 1 are the wash-up sinks whose internal measurements are 2 feet 6 inches long, 1 foot 8 inches deep and 2 feet 2 inches wide. The top of each sink is 3 feet above the floor.

No. 25 in Figs. 1 and 4 is a slow combustion stove.

No. 26 in Figs. 1 and 4 is the hot-water cylinder.

No. 27 (shown in broken lines) in Figs. 1 and 4 is a boiler for the provision of steam.

Nos. 28 in Fig. 1 are arches.

No. 29 in Figs. 3 and 4 is the cold-water supply tank.

No. 30 in Fig. 6 is a tube of tinned metal into which the funnel fits snugly.

No. 31 in Fig. 6 is a pipe extending through the wall.

No. 32 in Figs. 1 and 5 is a concrete block built into the wall to carry the slab, No. 21.

No. 33 in Figs. 1 and 7 is the galvanized piping forming the can drying racks.

Nos. 34 in Fig. 1 are drainage channels which should be shallow and wide, without sharp corners, and towards which the floor should have a fall of 1 inch in 3 feet.

No. 35 in Fig. 1 is the feed room which can be partitioned if desired.

No. 36 in Fig. 1 is the storm-water drainage channel.

MATERIALS REQUIRED FOR A SHED FOR 20 COWS

(Continuation of Table on following page).

ADDITIONAL MATERIAL REQUIRED PER STALL FOR 2 COWS.

Cement: 7 pockets.
Sand: 1.7 cu. yds.
Stone: 2 c. yds.
Bricks: 1,050
Lime: 3 bags.

Roof:—

Wall-plates: 7 lin. ft.
Bearers: 7 ft.
Rafters: plus minus 2 14' lengths.
Purlins: 21 lin. ft.
Poles: plus minus 2/11' lengths.
Corrugated iron: 4/15' or 5 8' lengths.
Guttering: plus minus 2 4' lengths.

Extra costs: plus minus £13.

MATERIALS REQUIRED FOR A SHED FOR 20 COWS.

Item.	Pockets Cement.	Cu. yds. Sand.	Cu. yds. Stone.	Brick.	Bags Lime.	Lengths of wood (sawn).	Zinc.	Costs.		Prices Total.
								Rate.	s. d.	
Foundation— Concrete, 1 : 3 : 6 mixture, 24" × 9"	34	7.5	15	—	—	—	—	16.5 e. yds. @	35 0	28 17 6
Floor— Concrete 1 : 2 : 4 mixture, 4" thick	68	10	20	—	—	—	—	24 e. yds. @	40 0	48 0 0
Mangers, steps, lintel, and other work concrete, 1 : 2 : 4 mixture.....	27	4	8	—	—	—	—	9 e. yds. @	50 0	22 10 0
Brick supporting layer, 13½" thick × 18" high in 1 : 3 lime plaster....	—	4.5	—	7,700	16	—	—	19 e. yds. @	35 0	33 5 0
Walls, brick, 9'-11' high, plastered with 1 : 3 lime.....	—	18	—	31,900	63	—	—	75 e. yds. @	35 0	131 5 0
Plaster, 1 : 4 cement, ½" thick.....	23	7	—	—	—	—	—	7 e. yds. @	70 0	24 10 0
Roof— Wall plates : 4½" × 3".....	—	—	—	—	—	200 lin. ft	—	2,070 sq. ft. @ per 100 sq. ft.	60 0	62 2 0
Supporting beams : 9" × 1½"....	—	—	—	—	—	8/10' lengths	—			
Rafters : 6" × 1½".....	—	—	—	—	—	30/14' lengths	—			
Purlins : 3" × 2".....	—	—	—	—	—	420 lin. ft.	—			
Poles, 4½" × 4½" or round.....	—	—	—	—	—	8/11' lengths	—			
Corrugated iron.....	—	—	—	—	—	—	80/15' lengths 160/8' lengths 26/6' lengths	—	—	
Guttering.....	—	—	—	—	—	—	—	—	—	—
TOTAL.....	152	51.0	43	39,600	79	—	—	—	—	350 9 6

N.B.—Cement in 183lb. pockets; lime in bags containing 3 cu. ft..

Rotational Cropping is Indispensable to Sowing-Lands.

S. W. Walters, Extension Officer, Queenstown.

THE unsatisfactory conditions of most arable soils of the eastern Cape Province to-day make it imperative for the present farming methods to be improved. The antiquated methods which are still employed must be replaced by systematic rotational cropping which will contribute in no small measure towards restoring the fertility and physical condition of the soil.

Present Cultivation Methods.

The old method of ploughing sowing-lands towards the the end of January and the beginning of February and sowing them to oats, barley or wheat as supplementary winter grazing, is still being applied. Although these sowing-lands are grazed during the winter months by large and small stock which provide the soil with a certain amount of organic matter in the form of animal manure, this does not appear to have any considerable effect on the improvement or the maintenance of a good physical soil structure. The small quantity of animal manure so obtained cannot improve the soil sufficiently to offset the harm wrought by the cultivation of winter cereals on the same lands year after year.

In these parts the application of compost or kraal manure is negligible, the reason being the limited facilities for making compost or kraal manure. The animal manure is usually scattered over the lands and the pastures where it is collected by native women and used for fuel during the winter months. The small quantities of manure obtained from stables and kraals is mostly used for gardening purposes.

On the whole, the sowing-lands have reached what soil analysts describe as a "sol" condition, i.e., the soil colloids are suspended in water and do not adhere together in groups as in the case of soil with a good aggregate structure. These soils are no longer brittle, but compact, are difficult to cultivate and are impervious to water. The result is that when the soil dries out after rain, it cracks and large clods are formed when ploughing is carried out.

Disadvantages of th's System.

(1) The most outstanding feature of this state of affairs is the fact that with the usual rainfall, the period which elapses between the time when the soil is too wet until it is once again too dry, is so short that only a very small area can be cultivated effectively. Frequently a large portion of a crop such as maize is a failure because it was sown too long after the sowing season or because, due to the fact that the soil did not have the capacity for absorbing and retaining the required quantity of water, the seedlings which sprouted after the first rains were unable to resist the intervening droughts.

(2) Since clay soil especially, has such a poor structure and consequently absorbs water with difficulty, it is interesting to note the effect of a heavy thunder storm on this type of soil. After a heavy downpour it will be found that only the top layer of the soil is wet and transformed into a muddy mass, which forms a hard crust on drying. This is known as the "compacting" of soil. These conditions make it difficult or even impossible for seeds, especially grass

seeds, to germinate. In this way, temporary bare patches appear on the land and sheet erosion may ensue with the next rain.

In times of drought, large cracks and deep channels are formed on these soils, especially on old land. This creates conditions conducive to large scale soil erosion during heavy rains.

(3) The more sandy soil types, which are ploughed year after year for the cultivation of winter cereals, are subject to the ravages of wind erosion because of their low fertility and poor structure. Strong winds are accompanied by clouds of dust—a clear sign that the top layer of soil is systematically being blown away.

Preventive Measures.

The only method of controlling these evils is to apply improved methods of soil cultivation so as to restore the aggregate structure and protect the soil against erosion. This can be done by building contour walls of the right type, especially in the case of sloping lands, and then applying a system of crop rotation which includes, among other crops, grass pasturage over a period of 3 to 4 years. The pasturage may consist of winter grasses such as Italian Rye grass, *Phalaris tuberosa*, Subterranean Clover, Chilean Red Clover, etc., and summer grasses such as Rhodes grass, *Setaria*, *Paspalum* and lucerne.

Winter grasses in a rotational system with winter cereals will not only improve the soil structure and fertility, but will also serve as winter grazing, the very purpose for which winter cereals are sown annually in these parts. The reason why perennial grasses can improve the soil structure, over a period of 3 to 4 years, is that the denser and finer grass roots accelerate the formation of humus, which, in turn, helps to restore the desired structure. The formation of humus is said to be brought about by favourable conditions created by the grass roots for the development of certain bacteria, e.g., the Rhize group, an important humus producer. It is also claimed that humus is the product of the action of bacterial enzymes on the dead bodies of the bacteria.

If a large portion of the sowing-lands is sown to perennial grazing, it means that for a few years that soil will not be ploughed and will therefore enjoy a period of rest. Frequent ploughing makes for excessive aeration—a condition which is conducive to the destruction of humus.

Advantages of Rotational Cropping.

- (1) The area of soil to be ploughed annually is cut down.
- (2) A saving of time, labour, animals and machinery is effected.
- (3) The farmer is enabled to plough in good time for his winter cereals by reason of the fact that established grass pasturage immediately benefits by rain.
- (4) Excessive cultivation and consequent aeration is eliminated and humus is therefore conserved.
- (5) In addition to providing good winter grazing, winter grasses may also yield a good hay crop in spring which will compare very favourably with, and even surpass, the winter-cereal crops.

Preservation of Timber for the Farm.

J. H. van Wyk, Department of Forestry.

THE Union of South Africa is very badly off as regards natural timber supplies. Hence it is imperative for us to make the best use of whatever supplies we have. All our better class of construction timber is imported. The rough timbers generally used on farms are, however, mostly obtained from the farmer's own wood lot or from the nearest Government plantation. The class of timber under consideration is fencing and straining posts, building poles for the construction of sheds or outbuildings, poles used for vine trellising,

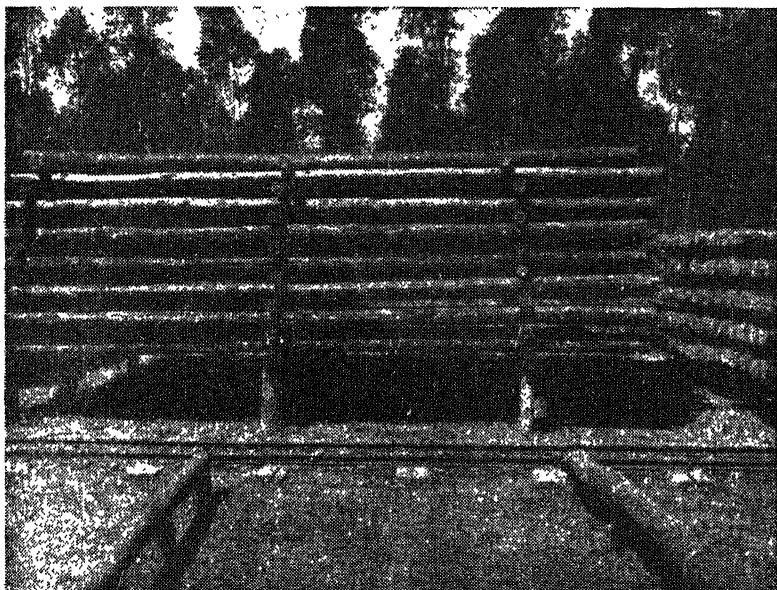


FIG. 1.—Correct method of stacking poles for air-seasoning.

etc. The extensive use of old boiler tubes and iron standards in South Africa is due to the fact that a sufficient number of durable wooden poles from indigenous trees were not obtainable in the past. Large quantities of poles from exotics grown in Government and private plantations have, however, become available in recent years. Without exception these poles are, unfortunately, not durable, and will only last a year or two at best in contact with the ground. In all other respects they are quite suitable for farm use.

Preservatives.

Poles from the young trees of all exotics at present grown in this country, with the exception of cypress, lend themselves readily to preservative treatment. Treatment with creosote, properly carried out, can make the most non-durable woods last 20 years and longer under the most adverse conditions.

There are several timber-treating processes in use, and of these the one most adaptable to farm use is the open-tank or hot and cold bath process. The underlying principle of the open-tank process is

that if dry wood is submerged in a hot liquid, the air in the cell cavities of the wood expands and is partly removed.

If the liquid is now allowed to cool, the air contracts and liquid is drawn into the wood. Good penetration can be obtained by this method, depending on the wood, its moisture content and the temperatures used in the treatment.

Preparation of Poles for Treatment.

Cutting time.—The best time of the year to cut trees for poles is during autumn, from March to April. This allows for drying during the winter, when conditions are less favourable for decay or insect damage while the poles are drying.

Barking.—Bark is impervious to liquids and should therefore be thoroughly removed. Even the smallest strip of bark prevents the penetration of the preservative at that point. Bark comes off more easily while the poles are green, and should therefore be removed immediately after the poles are cut. The rate of drying is also considerably increased if the bark is removed. Bark is most conveniently removed by means of a spade or any sharp instrument similarly shaped.

Seasoning.—Dry wood absorbs preservatives much better than does green wood. Not only is it impossible to get good penetration, if any at all, in green wood, but if the wood dries out after treatment, checks and cracks are formed which may expose untreated wood to the attack of rot-producing fungi and wood-destroying insects. If this happens, the effect of treatment is completely nullified. The main object of the treatment is to create an outer treated portion, which serves as a protective sheath to any interior untreated wood, and keeps it intact.

After the trees have been cut and barked, they should be stacked in the open in such a manner that the air can circulate freely through the stack. The bottom row should be well off the ground. Figure 1 shows the correct way of stacking poles. It is not necessary to cut the poles to the exact length immediately the trees have been felled. This is better done when the poles are dry, when badly cracked ends can be trimmed off. Poles are considered dry enough for treatment when their average moisture content is 20 per cent. or less. The time taken for drying varies with the weather conditions of the locality and the species and sizes of the poles. Pine poles 3 inches to 5 inches in diameter and up to a length of about 16 feet will usually dry out sufficiently for treatment in from 4 to 6 months; gum and wattle poles will take from 6 to 9 months. Since the apparatus necessary for the determination of the moisture content of wood is usually not available on a farm, farmers should use the periods given above as a general guide. It is important that the poles be sufficiently dry, otherwise penetration is poor or may be prevented altogether.

Preservative Plant for Farm Use.

The amount of money that can be economically spent on the construction of a plant for the preservation of timber depends on the quantity of timber to be treated. On a farm the quantity to be treated is usually comparatively small, so that the plant must necessarily be fairly cheap. The plant must be of such a nature that creosote, which is very inflammable, may be heated with safety over an open fire. Many different types of plant have been evolved. The most common type makes use of a 90-gallon drum erected over a temporary brick fireplace, usually with a length of piping as a chimney to ensure a good draught. The drum, which measures 3 feet 6 inches in height,

can be sunk into the ground for half its length so as to make it easier to place the poles in it. Figure 3 shows this type of plant. It is suitable for fencing posts or short poles up to 6 feet in length. The poles are treated to a depth of 3 feet at a time; first one end and then the other. This plant is not suitable for long poles such as are used for shed building or high-trellising of vines. A plant similar to the one shown in Figure 3 was erected some time ago at Kelsey Farm near Stellenbosch, and is working very satisfactorily. The plant is erected just inside a shed so that long poles, if it is desired to butt-treat them only, can be put in at

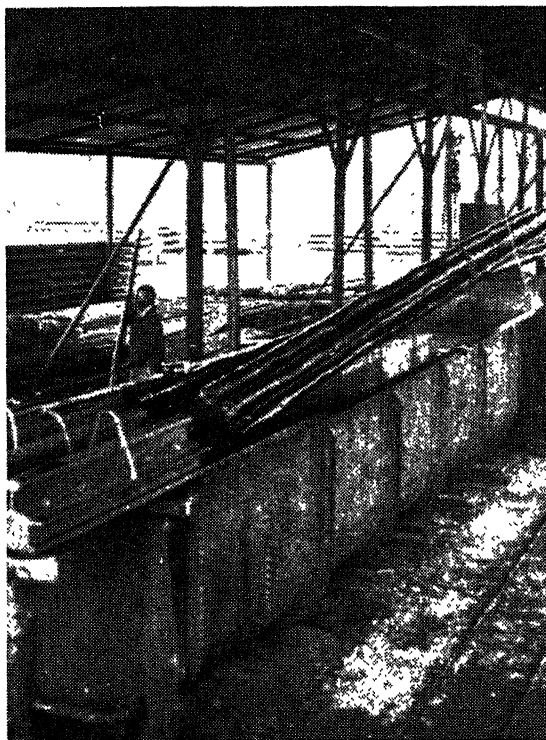
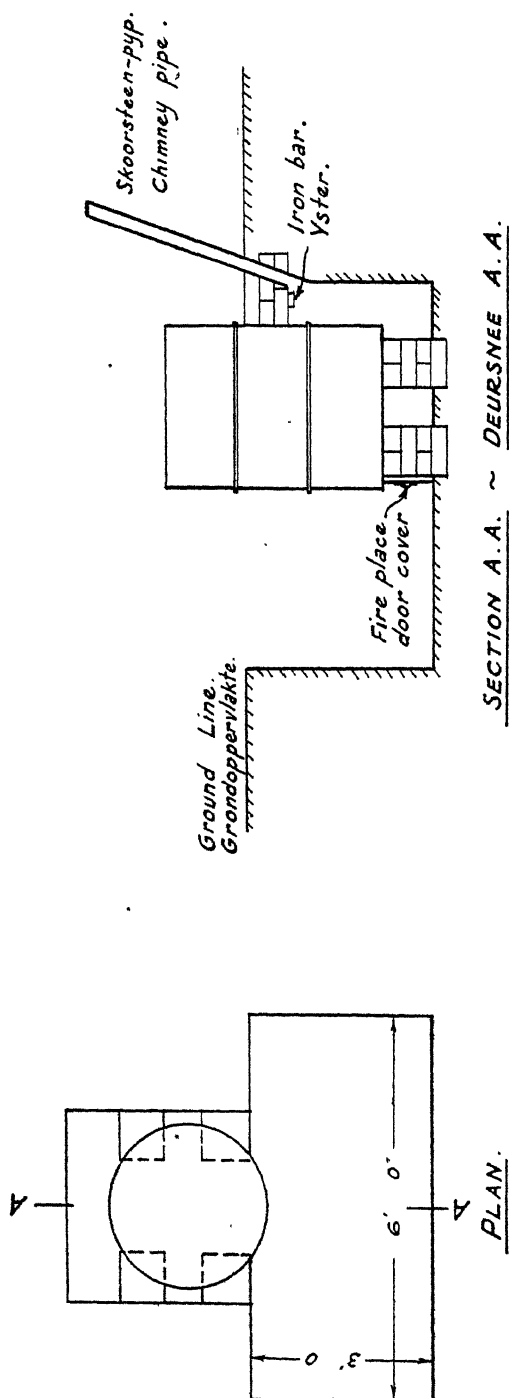


FIG. 2.—A home-made appliance for treating poles.

a slant with their tops projecting past the edge of the roof. The plant is sufficiently under the roof of the shed, however, to be protected from rain.

The plant shown in Figure 4 has been found to be efficacious, easy to work, and not expensive to construct. The tank is made from 18-gauge galvanized, flat sheet iron. The joints are soldered and riveted, and the tank can therefore be made by any plumber. It is built in with brick walls, as shown. The bricks should be placed tightly against the sides, so that the flames are kept down to the lower curved portion of the tank, which should be supported at both ends and in the centre by brick walls built to conform to the shape of the bottom of the tank. A wood fire is made under the tank through the two openings left in one side, and draught is provided through the two chimneys on the other side. The operator should be



PLANT SUITABLE FOR TREATING FENCE POSTS.
TOESTEL GESKIK VIR BEHANDELING VAN OMHEININGSPALE.

Fig. 3.

careful that, at all times, while the tank is heated, there is sufficient liquid in the tank to cover all soldered joints exposed to the flames. If this is not done, the solder will melt, causing the tank to leak.

Great care should be exercised in this respect to prevent unnecessary trouble and expense. Welding gives a more satisfactory job, but adds about 20 per cent. to the cost of the tank.

Process of Treatment.

The preservative in the tank described in Figure 4 is heated to a temperature of 180-200° F. While it is heating up, the poles are introduced and weighted down by means of any suitable weights that are available, such as blocks of concrete, steel rails or a drum filled with water, etc. A thermometer should be obtained to register the temperature, and the preservative should be kept at 180-200° F. for 1 to 2 hours. It should then be allowed to cool, and the poles removed when the temperature has come down to about that of the atmosphere. Most of the absorption takes place during the cooling, and the poles should, therefore, not be removed too soon. The best procedure is to treat only one batch of poles a day. Fill the tank with poles during the morning, heat it up to the required temperature, allow it to cool overnight, and remove the poles the next morning.

The absorption should range from half a gallon to a gallon per cubic foot. The volume of a pole 10 feet long, with a top diameter of 3½ to 4½ inches, is approximately one cubic foot. It may happen that the absorption is very heavy, especially with pine poles if they are very dry, resulting in wastage of preservative through bleeding afterwards. The absorption can be decreased by lowering the temperature to which the preservative is heated or by reducing the time the poles are kept at the hot temperature.

The penetration of the preservative should be tested by sawing a treated pole through the middle. It will vary with the kind of wood; with gums it is only possible to penetrate the sapwood, whereas with pines much better penetration, even complete penetration, can be obtained. The treatment should not be considered satisfactory unless the penetration is at least half an inch or more. Difficulty in obtaining satisfactory penetration is due to the poles not being dry enough, or failure of the operator to heat the preservative to the proper temperature and to maintain this temperature long enough.

If shearlegs and a block and tackle are available, they can be conveniently used, with the help of a trek chain, to hoist a load of poles into the tank and to remove the treated poles. On removal, the charge should be allowed to hang over the tank for about half an hour to allow the drip from the surface of the poles to fall back into the tank.

A few sheets of corrugated galvanized iron should be available to cover the tank or drum, in case of rain, to prevent water from mixing with the creosote. Water mixed with creosote causes the latter to froth up and boil over when heated. This increases the fire hazard considerably.

A mixture of 40 per cent. creosote and 60 per cent. fuel oil is sometimes used instead of the pure creosote. This is done when fuel oil can be obtained at a much lower price than creosote and is added to cheapen the treatment. The mixture is not as efficacious a preservative as pure creosote. Fuel oil has no toxic effect on fungi. The mixture is, therefore, not recommended unless the price of pure creosote makes the cost of treatment prohibitive, and the addition of fuel oil means a big saving.

In normal times the Department sells untreated poles as well as treated ones. Untreated poles can be obtained through any Conser-

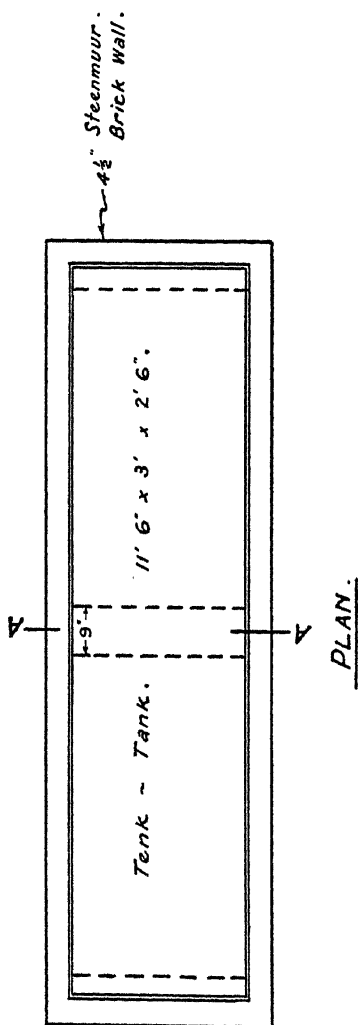
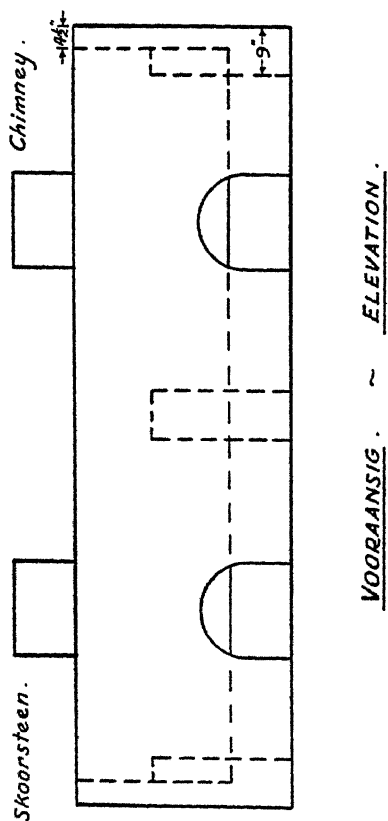
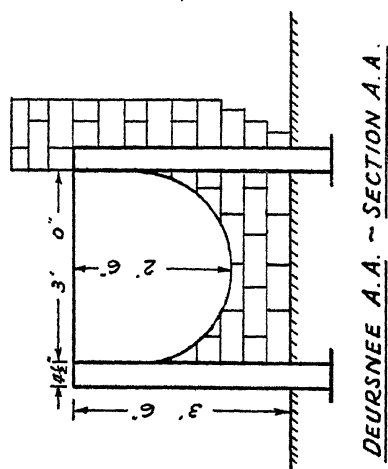


FIG. 4.

vator of Forests, and treated ones (when available) can be obtained from the Chief, Forest Products Institute, Pretoria West; the Forest Utilization Officers at George, Stutterheim and Pretoria; and the District Forest Officers at Kluitjieskraal, C.P., and Eshowe, Natal. A price list is obtainable from the Director of Forestry, Pretoria.

Farming Is a Business.*

IV. The Reward.

O. E. Burger, Division of Economics and Markets.

THE question to be answered in this short article, is the following. Is it worth while for a farmer to keep an account book, or, in other words, to what extent does the application, complete or partial, of the book-keeping system contained in the "Account Book for Farmers" yield results?

In the first place, it must be pointed out that most of our farmers to-day keep a so-called pocket-book, since the farmer has learnt from experience that he cannot rely on his memory alone. In this little pocket-book he makes a note of all the most important happenings on the farm and sometimes even of business transactions. *This is the beginning of all farm book-keeping.*

Investigation will show, however, that the pocket-books of most farmers contain insufficient information, since these books are small and very few details can be jotted down in them. Like other half truths, these incomplete notes on events and/or transactions, may therefore be misleading.

Having regard to these imperfections of the ordinary pocket-book, provision is made in the "Account Book for Farmers" for a diary (daybook) which is merely a pocket-book in a larger or more complete size. Although the farmer cannot carry the large leaves of the diary with him, he can always keep them on his desk or in any other convenient place where he can make rough notes at any time during the day. Columns are provided for convenience so that any receipts or payments made during the day can be entered.

Substituting a complete diary for an incomplete pocket-book is certainly a big forward step for the beginner in book-keeping. By making this change, he has turned a poor and halfhearted effort into a solid foundation for his book-keeping system, on which he can build with confidence.

Of course, the beginner cannot expect his book-keeping to enable him to make an immediate calculation of the financial result of his activities during the year. His first reward is that by making certain notes he gains a better knowledge of his business and ensures that certain important matters, facts or figures do not slip his memory, even after many years. For the first year at least, the farmer will therefore have to concentrate on his diary and its different branches, viz. the *Record of Products Produced on the Farm*, the *Livestock Register* and the *Labour Cost Record*. These three statements may be called specialized diaries, the first being of interest mainly to the grain and/or fruit farmer, and the second to the stock farmer. The third, of course, is concerned with labour.

The *analysis* of the financial transactions comes with the next stage of development. If his general diary has been kept according to instructions, the beginner will find all these transactions recorded there.

He may now choose between two alternative methods of developing his book-keeping system further. Using his diary as a basis, he can either apply the *Cashbook and Credit book system* or proceed

* The first article in this series appeared in the January issue of *Farming in South Africa* and the second and third articles appeared in the April and May issues, respectively.

directly to the analysis of the data in the *Records of Total Farm Receipts and Expenses* in the diary. The latter method is, of course, a short cut which obviates much work, but is neither as effective nor as satisfactory as the first, since, where this method is applied, the book-keeping system as a whole is incomplete.

With the data obtained in this way, together with a preliminary estimate of the capital increase or decrease during the year, the farmer can, at this early stage, calculate what the profit or loss of the farming concern as a whole will be at the end of the year. From this summary he will be able to obtain all the details required, when drawing up his income tax returns. Moreover, the farmer now has at his disposal all the information about every penny owed by and owing to him and about all the cash income and expenditure in connection with his business on any day of the month or year.

A more advanced stage of book-keeping consists in compiling a *Property list* or *Inventory*. In the same way as the diary forms the basis of the running or working branch of the enterprise, this property list is the foundation on which the whole farming business rests, that is, from the point of view of capital investment. Why is the property list not brought into operation at the very beginning, is a question which might well be asked. The reply is simply that drawing up and keeping a correct and reliable inventory is by no means an easy task for the beginner and he may be discouraged if he is confronted with so much at the outset. Although the inventory is drawn up only once a year, the valuation of the various assets demands considerable experience and involves untold mental strain.

In any case, drawing up a reliable property list is very definitely worth while. It may even be said that for the work it requires, the inventory contains more information as a separate statement than any other statement in the book-keeping system. At this stage the farmer is not only able to make a very accurate calculation of his farming income and expenditure for the year, but he also has a simplified and valuable balance sheet at the end of the year.

With this in view, it will be advisable to put the *Record of Farm Products Consumed in the Home* into operation. In this the housewife or whoever is responsible for the housekeeping will undoubtedly be of assistance.

This is as much as most of our farmers achieve with their book-keeping, since the next step, the analysis of the branches of activities, is based on the same principles as the calculation of costs and therefore requires endless arithmetical calculation.

It has been pointed out in a previous article that when analysing the branches of activities, the farmer will require the part-time or whole-time services of a book-keeper. Here, the main purpose of his book-keeping is not only to establish the relative profitability of the various branches of his farming enterprise, but also to determine which of these branches are unprofitable and should therefore be eliminated or replaced, *without the balance of his farming organization as a whole being disturbed*.

It may seem unnecessary to point out how the farmer is actually rewarded in hard cash for his book-keeping [that is, if he can determine the unprofitable and therefore retarding branch(es) in his business] but it goes without saying that his figures and analysis must be absolutely correct and reliable so that he will have the courage of his convictions to react to his findings, and to reorganize, where necessary, or eliminate retarding or uneconomic factors.

Water for Stock in the Perennial Rainfall Coastal Belt.

C. D. B. Liebenberg, Pasture Research Officer, Grahamstown.

ALTHOUGH the Port Elizabeth, Alexandria and Bathurst districts enjoy a comparatively good rainfall, which is distributed over the greater part of the year, being slightly more winter-predominant in the south and somewhat more summer-predominant in the north, the provision of drinking water for stock is not as secure in quantity and of as good a quality as is desirable.

The construction of earthen dams is not feasible over a great part of this area, as the sandy soil will not hold water, and the run-off from even a heavy shower is almost negligible.

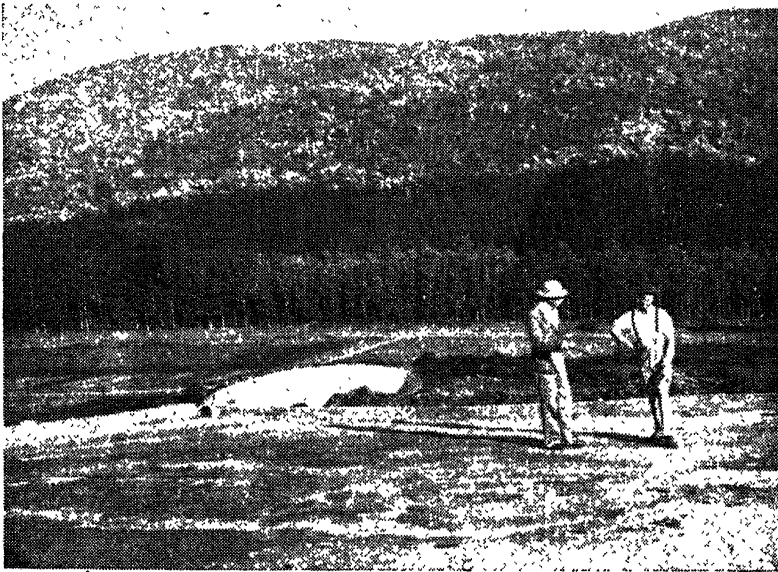


FIG. 1.—Stock-watering unit at Langebosch. Cement-sand apron still under construction.

Surface water is unknown over a large part of this area. Deep drilling has therefore to be resorted to in order to obtain underground supplies, and even then the borehole may in all probability yield only a small supply of water so brackish as to be almost undrinkable.

For the first two hundred feet the soil formation may be so loose and sandy that lining the borehole is not only desirable but necessary. The cost of erecting a windmill (the lining and all the necessary piping included) may amount to as much as £500. In spite of this heavy outlay periods occur when there is little or no wind with the result that stock-watering becomes a serious problem. In addition, the water is generally obtained only at one point and to obviate excessive tramping through concentrating all the stock at one watering place every day, the water must be piped, which entails further heavy expense.

To overcome these disabilities it has occurred to the writer that the translation into concrete of the roof-and-tank method of water

collection may be a satisfactory and cheap method of obtaining a reliable supply of good drinking water for stock on the farm. This is no new idea, as the principle is made use of at Aden and Gibraltar for collecting drinking water, as well as in the neighbourhood of Paarl and Riversdale. In the Paarl area advantage is taken of areas of exposed granite for the collection of the run-off; in other words, the granite is used as the apron described later.

An experimental unit was accordingly constructed at the Langebosch Research Station in the Alexandria district.

Requirements.

Theoretically the requirements for the construction of such a unit are:

(1) A surface of greater or lesser extent on a slope under concrete or cement-sand mixture, with an impervious top layer that will ensure the maximum run-off even with light showers. This is of the greatest importance, as a great deal of the rainfall consists of precipitations of under 0.5 of an inch per fall, and, unless the top layer of the cement-sand mixture is almost completely impervious, the absorption may be so great that water will run only with heavier showers of rain. The concrete or cement-sand mixture cover can be of the lightest, as the area must be well fenced in and the only pressure to be withstood is that of the rainfall. It is, however, desirable that it should be heavy enough to bear the weight of a person walking on it for inspection and repair purposes. The slope can be from quite gentle to fairly steep. The cement-sand slab is made in the shape of a triangle, low walls being built along two sides to concentrate the run-off to a bottleneck. (See Figs. 2 and 5.)

(2) A silt-trap at the bottleneck. This consists of a concrete-lined hole, the inside measurements of which are about two feet wide, six feet long and three feet deep. The function of this silt-hole is to



FIG. 2.—Stock-watering unit at Langebosch, showing bottleneck and silt-trap.

trap the débris that is bound to collect on the cement-sand slab and to prevent its entry into the dam.

At the bottom of the silt-trap a short piece of 3-inch piping with a cap outside may be inserted for easy cleaning. The inlet of the silt-trap should be level with the top of the walls at the bottleneck.

(3) A concrete, brick or cement-sand dam or reservoir in which the water can be collected and conserved. The level of the top of the

dam wall must be about the same as that of the base of the silt-trap, so that water can easily be led from the silt-trap into the dam. In the dam wall two pipes should be inserted, namely (a) at the base, a three-inch pipe with a cap outside for easy cleaning of the dam, and (b) six inches to a foot from the base, a pipe for leading the water to the drinking trough.

Size of the Dam.

The relation between the size of the cement-sand slab or apron and the capacity of the dam or reservoir is governed by the fact that 1 inch of rainfall, precipitated over an area of one morgen, where the run-off is 100 per cent., will yield 48,019 gallons of water.

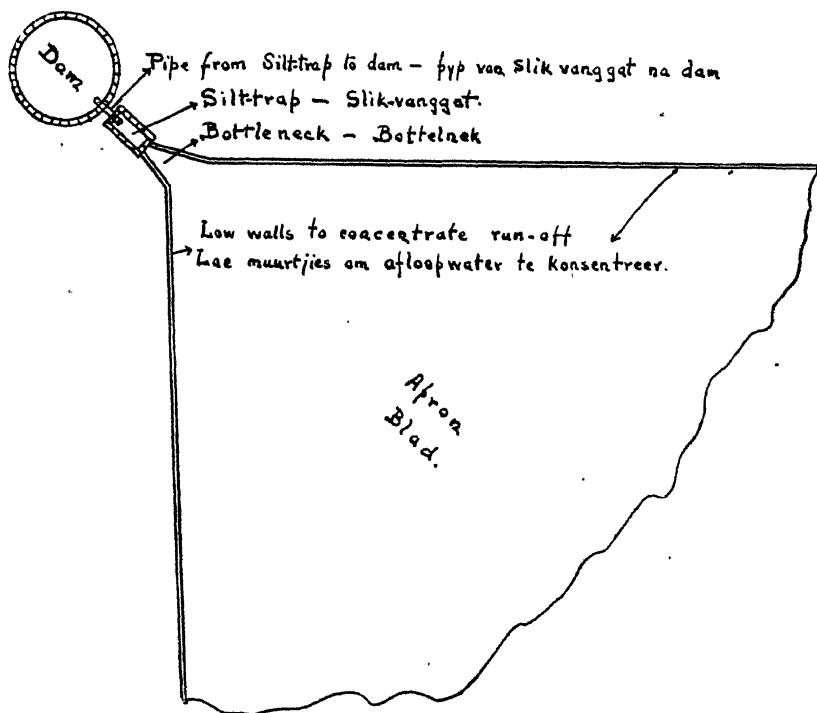


FIG. 3.—Diagram of stock-watering unit at Langebosch (not according to scale).

Depending on the amount of water required, a greater or smaller dam can be constructed. A convenient size of dam is one of 30,000 gallons. For this a cement-sand apron of 2,000 sq. yds. or $\frac{1}{5}$ of a morgen will be found suitable, so that the dam should fill with every 3 to 4 inches of precipitation. As an ordinary Van Meerten reinforced reservoir is what is required, no further details are given.

Construction of the Apron.

In constructing the cement-sand apron, various methods were tried. The topsoil with its high organic matter content was removed, as the expansion and construction rate of this soil is high. Excessive

bumps were levelled, so that a more or less even fall was obtained. The two methods tried first were:—

(a) Soil-cement stabilization of the top $1\frac{1}{2}$ to 2 inches of soil and then putting down a premixed 1:9 cement-sand layer about 1 inch thick. Care was taken to mature this layer well by keeping it damp and allowing it to harden slowly. When this layer had dried, it was covered with a $\frac{1}{4}$ -inch layer of a mixture of 1 part cement to 2 parts sand. This was trowelled well to get an impervious layer.



FIG. 4.—Stock-watering unit at Langebosch, showing dam provided with concrete roof.

(b) Laying down netting wire on the ground and on this a 1-inch layer of premixed 1:9 cement-sand mixture. When this had matured, a $\frac{1}{4}$ -inch layer of 1:2 cement-sand mixture was put on. This was trowelled well to get an impervious layer.

Both methods gave good results as far as hardness was concerned, and the apron easily withstood the weight of a person walking on it. Cracks in the cement surface, however, became serious and absorbed a considerable amount of water.

Ultimately, the only satisfactory method was to lay the cement-sand in blocks about six feet square by about $1\frac{1}{2}$ in. thick and to allow $\frac{1}{4}$ -inch expansion joints, which were filled in with bitumen, the thickness of the plank casing used for laying the cement-sand block forming the expansion joint.

Readers will be interested in the experience of a farmer who constructed one of these units and in what it cost him.

Mr. G. Casali of "Southern Hills" in the Port Elizabeth district had a stock-watering problem and was given details about this system. He constructed a unit (see Fig. 5). The cement-sand apron is 2,240 sq. yds. in extent and the capacity of the dam 30,000 gallons. The apron was laid down in blocks 6 ft. by 6 ft. and $1\frac{1}{2}$ inches thick, and an expansion joint of half an inch allowed. This was filled in with bitumen. Difficulty was experienced in getting a workman who could trowel the top layer of cement to a sufficient hardness. Eventu-

ally he found his man and Mr. Casali stresses the employment of good workmen.

The total cost in labour, materials and cartage amounted to £180, but he is of the opinion that, if he builds another unit, he will construct it for less, as one profits by the experience of building the first. The average cost should be about £150. Subsequently Mr. Casali built another 30,000-gallon reservoir under the same apron, as the water that ran waste was considerable, despite the fact that he watered all his stock and used the water for other purposes.

At £150 per unit, at least three can be built for the cost of erecting one windmill. Since a fairly adequate, all-the-year-round rainfall is experienced, this means that three or more camps can be provided with a good supply of excellent drinking water as against the windmill's single watering point.

Application of the System.

It is considered that this system of collecting and conserving drinking water for stock will, however, only be applicable over a

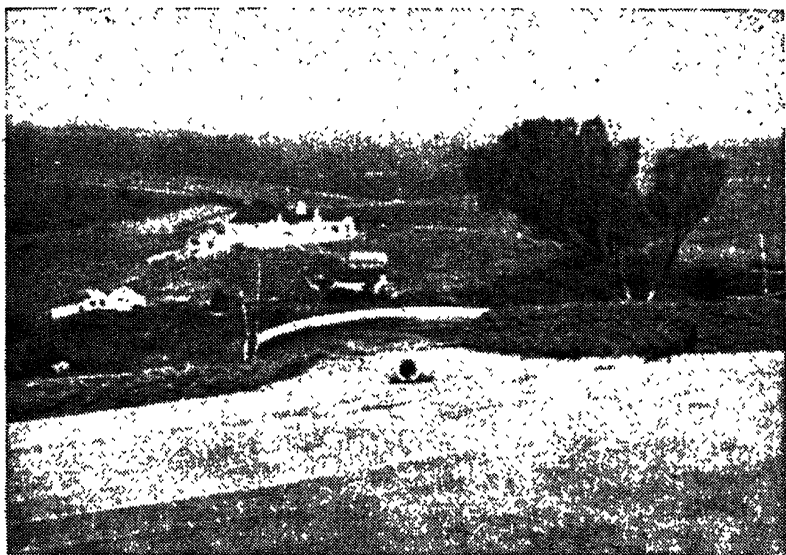


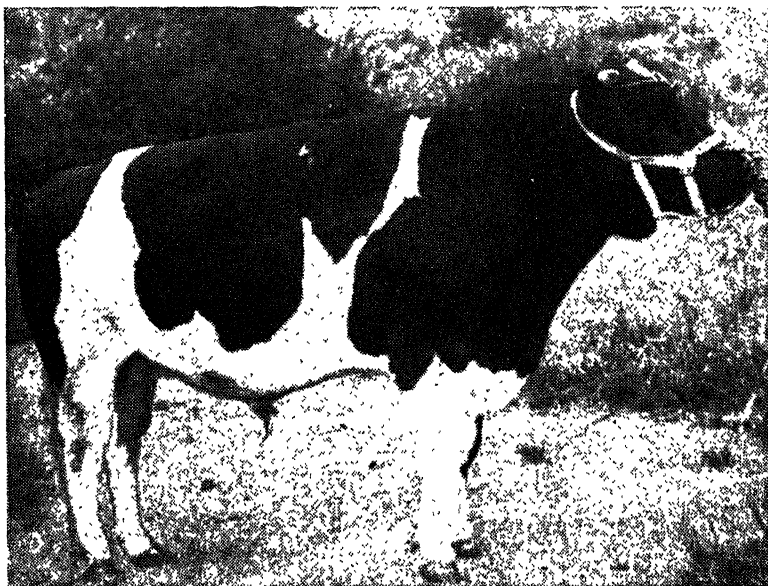
FIG. 5.—Stock-watering unit at "Southern Hills". Note silt-trap at far end and pipe leading to dam.

limited area, as, in the first place, earthen dams can be made over the greater part of the Union, and rainwater runs off only too readily in most parts of the country. Secondly, if the rainfall is seasonal, the capacity of the storage dam(s) must necessarily be big so that the water will last during the months when no rain is experienced. Along the coast, however, there is practically no month of the year when some rain does not fall, so that the apron system will work without large storage dams having to be built.

The Breeding Value of Friesland Bulls in South Africa.*

Dr. F. N. Bonsma, Department of Animal Husbandry, Agricultural Research Institute.

(3) Botermijn 11095/8 (18658 F.R.S.)



Botermijn.

Date of Birth: 14 April 1929.

Breeder: Jan T. Boersma, Friens, Holland.

Died: May, 1934.

Owner: Mrs. K. M. Drysdale, Bezuidenhout Valley, later Mackenzie Farm, P.O. Roodekop.

Score: 78 points in Holland.

Botermijn was imported by Mrs. K. M. Drysdale in October 1931 for the Stonehenge herd.

Pedigree.

Lodewijk Achilles, 16796, Pref...	Achilles, 14848.....	{ Siebel, 11915. Setske, 36099.
	Mietjie XIII, 55394.....	{ Lodewyk, 13337. Mietje Albert, 26632.
Sietsche XVI, 58890.....	Lodewijk, 13337.....	{ Wodan, 9944. Lady XI, 42451.
	Sietsche XIII, 47742.....	{ Hatsumer Gerard 8592, Pref. Sietsche X, 32924.

* This article is the second of a series, the first of which appeared in the April, 1946, issue.

THE BREEDING VALUE OF FRIESLAND BULLS IN SOUTH AFRICA.

Production of Dams and Granddams.

	Age.	Milk.	B.F. %.	Days.
Dam.....	7	18,403·0	3·96	330
	8	14,194·4	4·29	356
Sire's dam.....	2	8,547·0	3·95	324
	3	11,444·4	4·22	328
Dam's dam.....	2	7,605·4	3·72	318
	3	7,315·0	3·86	266

From the pedigree of Botermijn 11095/8 it will be seen that he is a son of Lodewijk Achilles 16796 F.R.S., which was imported by Messrs. A. A. Kingwill and Sons of Colonies Plaats and was declared preferent in South Africa in 1939.

Botermijn is linebred to Lodewijk 13337 on both his sire's and dam's side. Through all four his great grandsires he is directly or indirectly descended from the famous preferent line of sires—Gerard 6808, Nico 4969 and Jan 3265.

Botermijn was used in Holland before he was exported to South Africa and left a number of progeny, amongst others the well-known cow Grietjie XXX 85203.

In South Africa he was used exclusively in the Stonehenge herd and left 18 males and 22 females.

Analysis of Data.

From the available milk records it was possible to analyze 16 dam-daughter comparisons. In all, 19 daughters were recorded. The daughter records were all produced in the Stonehenge herd, under the conditions prevailing at Mackenzie Farm which is situated on the highveld between Johannesburg and Heidelberg. The majority of records produced by the dams were also recorded in the Stonehenge herd, although a number of these animals were not bred by the owner.

Climatically the area is well suited to Friesland cattle. The feeding and management in the Stonehenge herd has always been of a high standard. From an environmental point of view, i.e. feeding, management and care, the production records of both the dams and their daughters were produced under favourable and comparable conditions. Unfortunately the majority of cows were not tested for more than two or three lactations.

The analysis of the 16 available dam-daughter comparisons made on the average corrected 2-year-old basis is shown below.

Milk Yield and Butterfat Percentage.

Daughters (16).	Dams (14).	Average increase or decrease in production of daughters.	Percentage of daughters which show an improvement.	STATISTICAL SIGNIFICANCE.	
				P = .05.	P = .01.
10,181·6 lb.	9,460·7 lb.	MILK + 720·9 lb.	YIELD. 69%	Sig.	Not sig.
3·86%	3·62%	BUTTERFAT PER. +·24%	CENTAGE. 75%	Sig.	Sig.

The distribution of the individual dam-daughter comparisons for milk yield and butterfat percentage is graphically shown in Figures 1 (a) and 1 (b), respectively. The average calculated two-years-old production of all the available Botermijn daughters (19) is 10,157.6 lb., with an average butterfat percentage of 3.859 per cent.

From the forgoing analysis it is apparent that Botermijn 11095 bred daughters of a high productive capacity for both milk yield and butterfat percentage.

Sixty-nine per cent. of the daughters showed an improvement in milk production over their dams, and the average increase in milk yield of 720.9 lb. of his daughters was statistically significant ($P < .05$). The age-corrected production of his daughters varied between 8,638.8 lb. and 11,810.5 lb. which indicates a remarkable consistency of breeding for milk yield, this being further evident from the distribution of the individual dam-daughter comparisons as shown in Figure 1 (a).

The significant ($P < .01$) increase in butterfat percentage of 0.24 per cent. by his daughters as compared with their dams is very satisfactory and an indication of the hereditary qualities of Botermijn for transmitting a high butterfat percentage. The average of 3.859 per cent. for all his daughters is considerably higher than the average

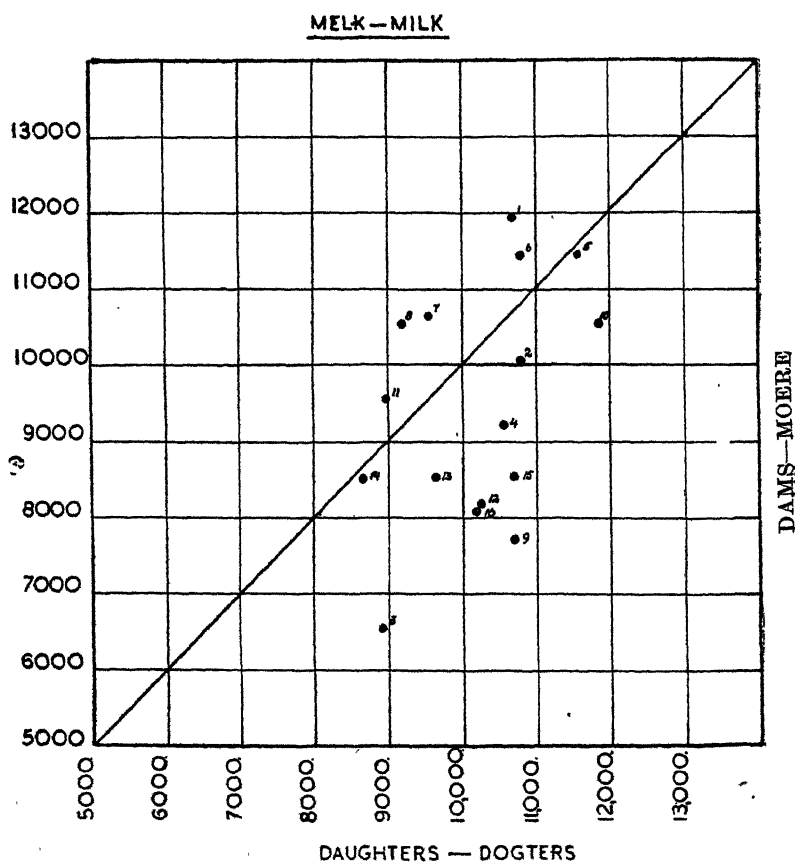


FIG. 1 (a).—Daughter-dam comparisons for milk yield on 2-year-old basis.

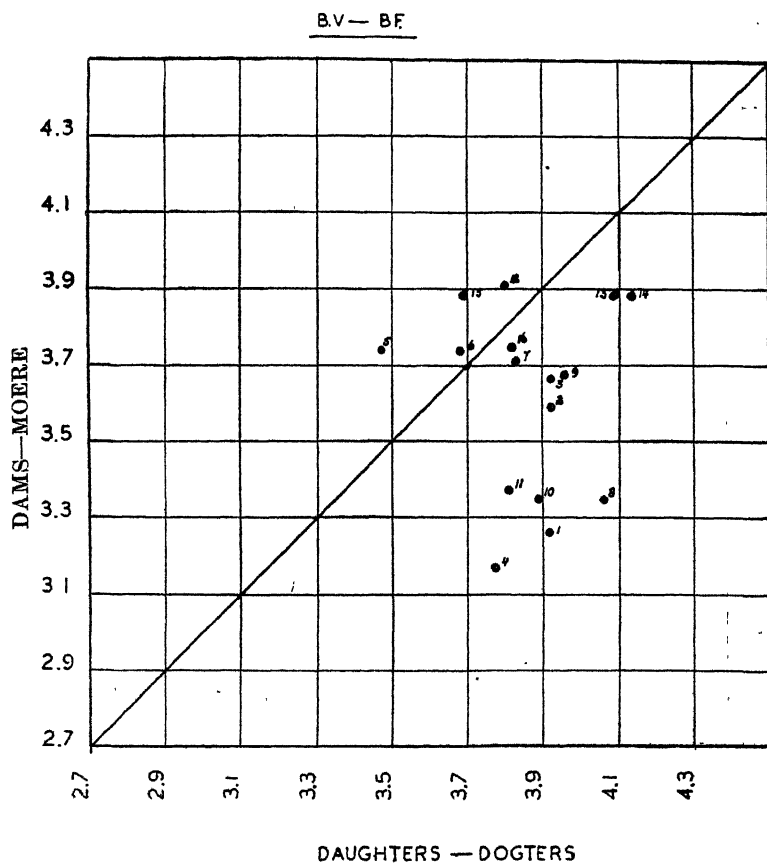


FIG. 1 (b).—Daughter-dam comparisons for butterfat percentage.

for the breed. The uniformity of his breeding for butterfat percentage is illustrated in Figure 1 (b) from which it will be seen that the percentage butterfat of his daughters varied between the limits 3.48 per cent. and 4.13 per cent.

Botermijn was used on cows from a number of different sires and consequently with the limited number of progeny it was not possible to analyze the influence he had on the daughters of any particular sire. One particular comparison is of interest, namely of three full sisters out of the cow De Schone Surprise S.S. of Batavia 12440/7 (a daughter of De Schone Hendrik 7322/6).

Botermijn daughters.	Dam.
1. St. Surprise I, 10,679.0 lb. milk, 3.70% B.F.....	{ De Schone Surprise S.S. of Batavia. (8,536.3 lb. milk, 3.88% B.F.)
2. St. Surprise II, 9,627.5 lb. milk, 4.08% B.F.....	
3. St. Last Surprise, 8,638.8 lb. milk, 4.13% B.F.....	

Bull: BOTERMIJN 11095/8 (18658 F.R.S.)

OFFICIAL SCORE OF										
	Head.	Neck, Chest, etc.	Crops, Ribs, etc.	Hips, etc.	Thighs, etc.	Hocks, etc.	Udder, etc.	Skin, Hair, etc.	Charac- ter and True- ness to Type.	General Appear- ance.
OFFICIAL SCORES OF FEMALE PROGENY.										
A										
AB										
AB-										
B+			/	/	//		//	/	/	
B	///		///		///	///	///	///	///	///
	///	///	///	//	///	//	///	///	///	
B-	///	///	///	///			///	/	///	///
		//								//
BC+	///	///	///	///		///	//		///	///
										/
BC		/		///		///	//			
				//		/				
BC-						/				
C+										
C										
CD										
TOTAL SCORES.										
	77.1	78.5	79.4	79.0	80.2	75.7				
	79.2	73.9	77.9	77.9	75.2	77.8	77.9			
	74.8	75.2	75.2	75.8	74.7					
AVERAGE.										76.95

FIG. 2 (a).—Official scores of female progeny of Botermijn.

THE BREEDING VALUE OF FRIESLAND BULLS IN SOUTH AFRICA.

Botermijn (continued).

Head and Horns.	Neck, Chest, etc.	Crops, Ribs, etc.	Hips, etc.	Thighs, etc.	Hocks, etc.	Milk Indication.	Character and True-ness to Type.	General Appearance.	
OFFICIAL SCORES OF MALE PROGENY.									
									A
									AB
									AB—
									B+
		//	/	///		///	/		B
/	//		/	//	//	/	/	/	B—
/	/	//	/			/	/	/	BC+
///	//		//		//		//	//	BC
					/			/	BC—
									C+
		/							C
									CD
SCORES. 72.5 70.4 72.7 76.7 76.6 <div style="text-align: right;">AVERAGE 73.78</div>									

FIG. 2 (b).—Official scores of male progeny of Botermijn.

From a milkproduction point of view the conclusion can be drawn that the daughters of Botermijn 11095 were not only significantly higher producers for both milk yield and butterfat percentage than their dams, but their average level of production was also of a satisfactorily high standard.

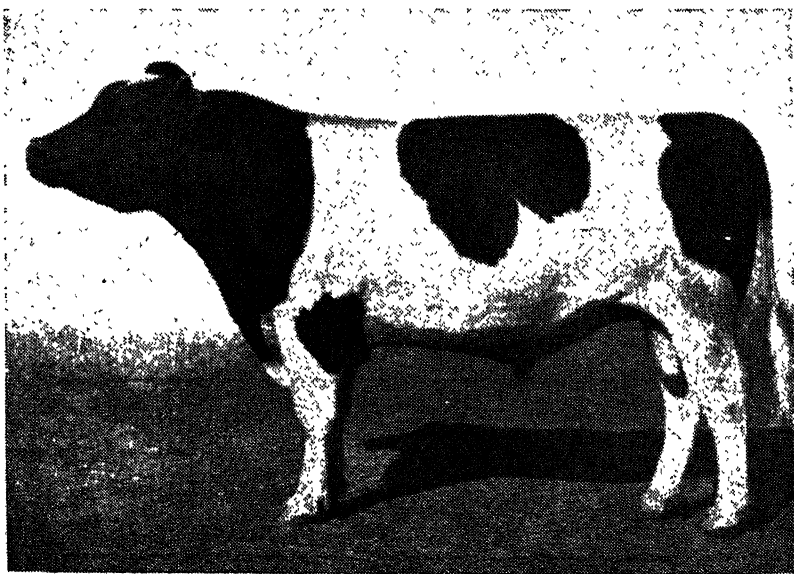
Conformation of Botermijn Progeny.

The analysis of the score cards of 5 male and 18 female progeny of Botermijn are shown in Figures 2 (a) and 2 (b). In addition, a number of mature Botermijn daughters which were still alive in 1945 were inspected at Mackenzie Farm. The average score of the available male and female progeny was 73.78 and 76.95 respectively.

Although the available data for his male progeny are insufficient to draw any definite conclusions, there seems little doubt that the Botermijn daughters were of a higher average standard of excellence for conformation than his sons.

The female progeny of Botermijn were of a high standard of excellence. The outstanding characteristics of his daughters were their excellent quality and mammary development. They were strong roomy cows with good fine quality bone and skin. On the whole, the heads were good. Some were inclined to be rather long in the face but had broad strong muzzles. Some of his daughters could be stronger across the loins. The general impression of the Botermijn 11095 daughters was that they were typical fine quality dairy cows.

(4) Grietje's Paul 13221/9.



Grietje's Paul.

THE BREEDING VALUE OF FRIESLAND BULLS IN SOUTH AFRICA.

(4) Grietje's Paul 13221/9

Born: 6 December 1933.

Died: 26 December 1940.

Breeder: J. N. Wassenaar, Jelsum, Holland.

Owner: Agricultural Research Institute, University of Pretoria.

Score: 77.9 points in South Africa.

Grietje's Paul 13221/9 was imported by the Agricultural Research Institute in March 1935.

Grietje's Paul was extensively used in the University herd from 1935 to 1940, except for one season when he was used in the herd of Glen College of Agriculture.

Pedigree.

Paul, 20703 F.R.S.....	{	Botermijn, 18658 F.R.S...	{ Lodewijk Achilles (Pref.), 16796. Sietsche XVI, 58890.
		Grietje XIV, 57973 F.R.S.	{ Marius, 11924. Grietje IX, 47263.
Grietje XXX, 85203 F.R.S.....	{	Botermijn, 18658 F.R.S...	{ Lodewijk Achilles (Pref.), 16796. Sietsche XVI, 58890.
		Grietje XX, 72078 F.R.S.	{ Athleet, 15272 (Pref.). Grietje VI, 39223.

Production of Dams and Granddams.

	Age.	Milk.	B.F.	Days.
Dam.....	2	11,175.0	4.41	294
	3	10,571.0	4.45	307
	4	13,629.0	4.54	318
	5	13,523.0	4.39	312
Sire's dam.....	4	10,399.0	4.25	326
	9	13,785.4	4.12	322
Dam's dam.....	2	8,585.0	4.62	320
	3	10,772.0	4.27	324
	5	17,557.0	4.80	376
	6	17,584.0	4.71	523
	8	16,318.0	4.92	417

From the pedigree of Grietje's Paul 13221/9 it will be seen that he is a double Botermijn 11095/8. On both the sire's and dam's side he is out of the famous Grietje line of females bred by the well known Friesland breeder, Jan Wassenaar of Jelsum, Friesland (See *Farming in S.A.*, Jan. 1942).

Twenty-six male and forty-two female calves were born to Grietje's Paul. Unfortunately contagious abortion broke out in the University herd in 1938 and it was considered advisable to dispose of all the positive reactors. Consequently, 16 of his female progeny were sold at Pretoria abattoirs in 1939. Sixteen daughter production records were available, all of which could be compared with those of their dams.

Analysis of Data.

The comparable dam-daughter records were all made under similar conditions of nutrition and management at the University Experiment Farm, Pretoria, and in the case of four daughters at the Glen College of Agriculture.

Under the existing environmental conditions at these institutions it is possible to make accurate comparisons between dams and daughters and to draw reliable conclusions as to the milk and butterfat transmitting qualities of Grietje's Paul 13221/9.

A comparison between the average age-corrected two-year production of the available 16 daughters and their dams is given in the table below.

Milk Yield and Butterfat Percentage.

Daughters (16).	Dams (14).	Average increase or decrease in production of daughters.	Percentage of daughters which show an improvement.	STATISTICAL SIGNIFICANCE.	
				P < .05.	P < .01.
8,918.1 lb.	7,462.9 lb.	MILK YIELD. 1,455.2 lb.	81.25%	Sig.	Sig.
3.83%	3.60%	BUTTERFAT PERCENTAGE. .23%	81.25%	Sig.	Sig.

MELK — MILK

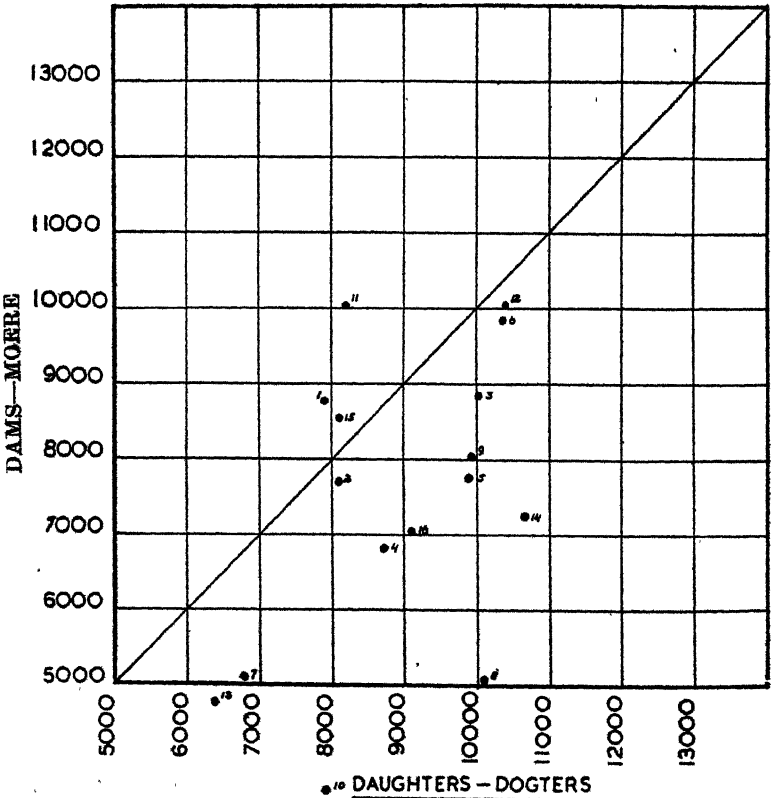


Fig. 3 (a).—Daughter-dam comparisons for milk yield on 2-year-old basis.

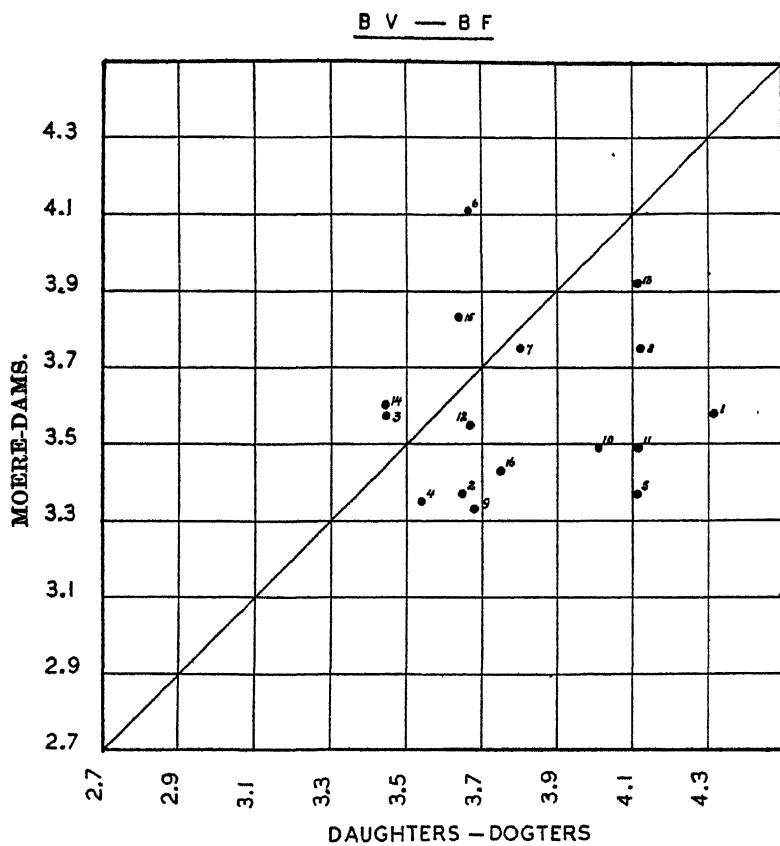


FIG. 3 (b).—Daughter-dam comparisons for butterfat percentage.

The distribution of the individual dam-daughter comparisons for milk yield and butterfat percentage is graphically shown in Figures 3 (a) and 3 (b), respectively. From the foregoing analysis and the graphical distribution of the individual dam-daughter comparisons it will be seen that Grietje's Paul 13221/9 had a very marked influence upon the production of his daughters. The significant ($P < .01$) average increase of 1,455 lb. of milk of his daughters as compared with their dams clearly indicates his prepotency and breeding value for increased milk production.

The graphical distribution of the individual dam-daughter comparisons is further proof of the consistency with which he transmitted his milking qualities. No less than 81.25 per cent. of his daughters were higher producers than their dams.

The average calculated two-year-old production of 8,918 lb. of milk for all his available daughters must be considered as very satisfactory, particularly in view of the lack of uniformity in production and breeding of the cows to which he was bred. The age-corrected production of his daughters varied between 6,373 lb. and 10,658 lb., whilst that of their dams varied between 3,586 lb. and 10,033 lb.

The significant ($P < .01$) increase in the average butterfat percentage of 0.23 per cent. of his daughters as compared with their dams is an indication of Grietje's Paul's hereditary qualities for

Bull: GRIETJE'S PAUL.

OFFICIAL SCORE OF.....										
	Head.	Neck, Chest, etc.	Crops, Ribs, etc.	Hips, etc.	Thighs, etc.	Hocks, etc.	Udder, etc.	Skin, Hair, etc.	Character and Trueness to Type.	General Appearance.
OFFICIAL SCORES OF FEMALE PROGENY.										
A										
AB										
AB—										
B+							/		//	
B	///	/// ///	/// ///	///	/// /// ///	/	///	/// /// ///	///	///
B—	///	///	///		/	//			///	//
BC+	/// ///	///	///	///		/// ///	/		/	/// ///
BC	///	/	/	/// ///		/	/		/	/
BC—				/						
C+										
C										
CD										
TOTAL SCORES.										
	74.4	75.0	80.1	74.4	79.3	70.5	74.8			
	73.1	76.0	75.6	77.1	73.9	75.1	75.2			
	80.6	77.6	75.2							
Average: 75.76										

FIG. 4 (a).—Official scores of female progeny of Grietje's Paul.

Grietje's Paul (continued).

Head and Horns.	Neck, Chest, etc.	Crops, Ribs, etc.	Hips, etc.	Thighs, etc.	Hocks, etc.	Milk Indication.	Character and True-ness to Type.	General Appearance.	
OFFICIAL SCORES OF MALE PROGENY.									
									A
									AB
									AB—
				//					B+
////	//			////		////	/		B
///	////	///		///			///		B—
/	////	///	/		///		////	////	BC+
//		////	////		////		/	///	BC
		//		/			/	//	BC—
									C+
									C
									CD
SCORES. 75.3 73.7 72.2 72.1 75.1 74.7 72.2 71.6 73.2 73.2 72.7 70.2 73.6 74.5 76.6 72.1 72.4 75.4 70.7 74.6 Average: 73.31.									

FIG. 4 (b).—Official scores of male progeny of Grietje's Paul.

transmitting a high butterfat percentage. The average butterfat percentage of his daughters varied between 3.46 per cent. and 4.32 per cent. The graphical distribution of the individual dam-daughter comparisons for butterfat percentage, as shown in Figure 3 (b), further indicates the consistency with which he bred for increased butterfat percentage. Compared with their dams, 81.25 per cent. of his daughters showed an improvement in butterfat percentage.

Unfortunately, Grietje's Paul was used on a number of cows of heterogeneous breeding, and consequently it is difficult to analyze the influence he had on the daughters of any particular sire.

A comparison can, however, be made between 4 daughters of Colonies Plaats Siebel Sam 6037/6 and their six daughters out of Grietje's Paul.

C.P. Siebel Sam daughters (4).		Grietje's Paul daughters (6).		Increase by Grietje's Paul daughters.	
Milk.	Butterfat %.	Milk.	Butterfat %.	Milk.	Butterfat %.
6,228.7 lb.	3.52%.	8,792.8 lb.	3.91%	1,564 lb.	.39%

The limited number of dam-daughter comparisons available seem to indicate that Grietje's Paul bred very well on the C.P. Siebel Sam daughters.

Conclusions.

Grietje's Paul 13221/9 is one of the few bulls whose daughters showed a significant increase in *both* milk yield and butterfat percentage as compared with their dams. The above analysis leaves no doubt as to his outstanding transmitting qualities and merit as a sire from a milk production and butterfat percentage point of view.

Analysis of the Conformation of the Progeny of Grietje's Paul.

The analysis of the official score cards of 20 males and 17 females, which were the available progeny of Grietje's Paul, are shown in Figures 4 (a) and 4 (b). From the data thus presented it will be seen that the average scores of the male and female progeny were 73.31 and 75.76, respectively.

The following conclusions can be drawn from the analysis of the score cards, supported by the writer's intimate knowledge of the progeny of Grietje's Paul. The Grietje's Paul female progeny were of a considerably higher standard than his male progeny.

Most of the Grietje's Paul daughters had rather plain heads but good strong muzzles. The outstanding characteristics of his daughters were their deep well-sprung centre pieces, strong loins and good udders. The hindquarters were often inclined to be slightly drooping and roofy. The hocks could be better. In general, they could be described as excellent utility cows.

The male progeny were strong plain utility bulls, lacking in character and symmetry and inclined to be weak in the hocks.

The Ploughing of Contoured Lands.

N. J. van Straaten, Lecturer in Engineering, College of Agriculture, Cedara.

THERE has been an increasing tendency on the part of South African farmers to practise "conservation farming", especially by those who plough lands on slopes. On many farms in the Natal area, the writer has, however, observed that the maintenance of contoured lands is not given the consideration necessary to gain the full benefit of the principle of contour ploughing.

Many farmers think that, when once contour banks or broad-base terraces have been constructed, or when grass strips have been laid down, these are sufficient protection for their lands, and they continue to plough the land between these strips or banks, starting from the outside, turning anti-clockwise at the heads and finishing in the centre of the strip (which is the usual method of ploughing), with the result that the soil adjoining the surveyed drain, or grass strip, is turned downwards toward it if a fixed mouldboard or disc plough is used. When a reversible hillside plough is used, the aim has always been to turn the soil over downwards. When it is borne in mind that loose soil has a natural tendency to slip down a slope, this usual method of ploughing accelerates the downward movement of the soil adjoining the drain, and one immediately realizes the cause of the drains filling up, the banking up of the soil against grass strips, or the creation of a second drain above the surveyed drain [as illustrated by (B) in Fig. 1], the lastmentioned case being the result of an attempt on the part of the farmer not to throw the soil into the drain. After a few ploughings, however, this drain becomes almost as deep as the constructed drain, with serious consequences, since it may cause damming of water (which should have been conducted along the surveyed drain at a low velocity to a provided outlet), and ultimately result in an accumulated volume of water overtopping the constructed banks. It is obvious, therefore, that ploughing should be carried out in such a manner that the soil is turned up, away from the contour drain and bank.

Principle Applied to Broad-base Terraces.

Fig. 2 illustrates this principle applied to the ploughing of broad-base terraces, the ploughing being done in three steps.

(1) Since it is essential to maintain the shape of the bank, the soil must be worked up from both sides towards the ridge, thereby building up the bank. The procedure in this case is to start ploughing just below the crown of the bank, and to turn back on the same furrow in a clockwise direction. Ploughing is carried on this way until the centre of the channel or drain is reached on the top side, irrespective of the area ploughed on the back slope of the bank. This is illustrated by strip No. 1 (Fig. 2), and the effect can be seen in Fig. 3 (F). It will be noted that a ridge is formed on the crown of the bank, and a dead furrow in the channel.

(2) Where the contours are irregular, the usual method of ploughing necessitates turning in ploughed ground when completing the final few furrows in the centre. Where tractors are used, the tracks so formed can also be a source of danger by causing damming, as mentioned previously. To minimize this, the irregular sections should be made as small as possible by drawing a furrow parallel

to the centre of the channel of the lower terrace, with a width equal to the smallest width between the terraces. This is easily done with the aid of a string equal in length to the width of the narrowest part between the terraces. One person walks in the channel, firmly holding one end of the string at his waist, while

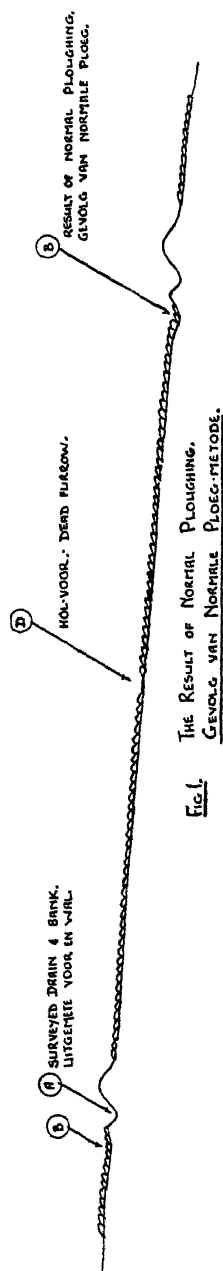


FIG. 1. THE RESULT OF NORMAL PLOUGHING.
GEVOLG VAN NORMALE PLOEG-METODE.

another stretches the string taut, holding it in the same way. The string is kept tight and more or less perpendicular to the direction of the channel, the plough following behind the second person. After this parallel furrow has been drawn, the irregular section

is then ploughed in the normal way. This is shown by Strip No. 2, Fig. 2.

(3) Finally the parallel strip is ploughed clockwise. To get the starting furrow in the centre the same procedure is adopted as for the first parallel furrow, the width of the strip or length of the string now being equal to half the width of the whole parallel strip. This is shown in Strip No. 3., Fig. 2. It will be noted in Fig. 3 that a dead furrow is again formed in the channel, and a ridge in the centre of the parallel strip, the soil adjoining the channel being thrown up and away from the channel.

This has two important effects, namely that the natural tendency of the soil to slip downward is partly checked, and that the drain is kept clean and open by having two dead furrows in the middle.

When this principle is applied to lands with contour banks, the bank itself is not ploughed, as illustrated in Fig. 4, but the drain can be widened with each ploughing, the bank built up, and a broad-base terrace eventually formed. The advantage of this need not be stressed. The method of constructing such banks with the plough has been described in an article by J. J. Gertenbach, in the May 1945 issue of *Farming in South Africa*.

An important point regarding contour banks and terraces that should always be borne in mind, is that the wider the channel, the more effective is the control of water, and that by following this method of ploughing the channel width can always be increased. This method can also be applied to ploughing between grass strips, thus obviating the accumulation of soil and the formation of banks on the top side of the strip.

Farmers should find the method described, simple enough, but the story does not end there. In future ploughings they should always change the position of the dead furrows and ridges in the land above the channels and the position of the ridge on the terrace banks, closing up and breaking down dead furrows and ridges from previous ploughings, thus preventing the creation of secondary banks and channels between the surveyed structures, as these can lead to serious washing. They should also keep the terrace banks built up but flat enough to facilitate the working of implements over them.

Ploughs.

It is necessary to point out some limitations of certain ploughs in following the method described above.

(a) It may be found that mouldboard ploughs with general purpose bottoms will not turn the sods entirely when working the soil upwards. This can be overcome by fixing extensions to the mouldboard.

(b) Disc ploughs without steering-gear may tend to slip downwards away from the furrow, leaving unploughed strips of ground when throwing up the soil.

(c) Where reversible hillside ploughs are used, they should have the shares set so that *all* the soil is thrown *upwards* instead of downwards. This is the ideal. In the case of reversible disc ploughs, however, the tendency to slip downwards away from the furrow, as pointed out in (b) is very marked, and it may be found better to use a fixed mouldboard plough.

Where the reversible hillside plough can be used successfully, it will be found easier to plough the land with this implement, following the steps mentioned in order to obviate large irregular sections—all the soil, of course, being turned upwards.

The ease of ploughing will depend largely on the slope of the lands. The steeper the slope, the more difficult will it become to plough properly, and the more reason will there be not to use such land for cultivation.

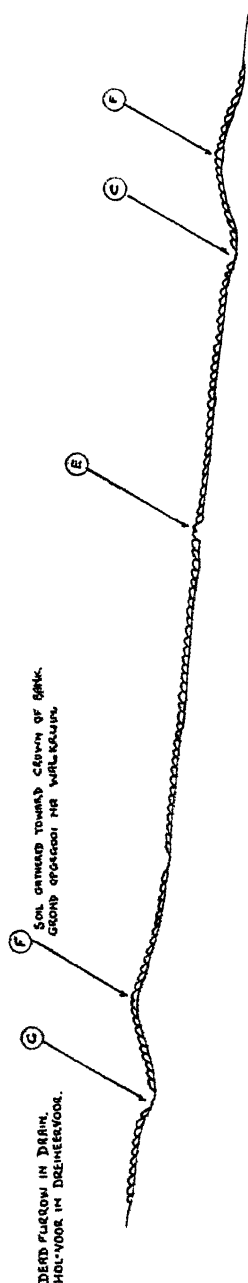
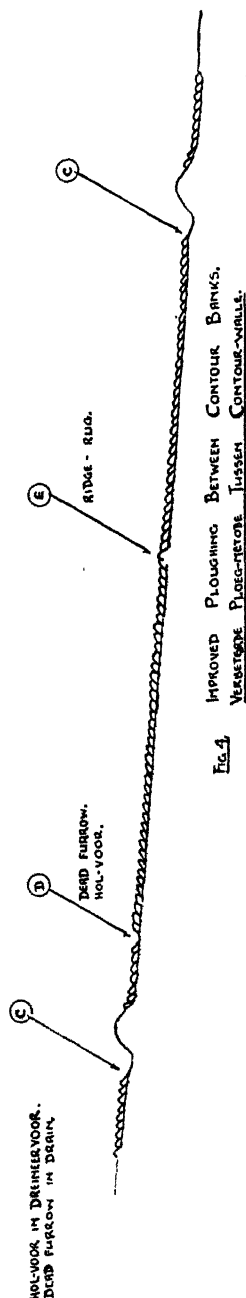


FIG. 3.

FIG. 4. IMPROVED PLOUGHING BETWEEN CONTOUR BANKS.
VEGETABLE PLOTS-BETWEEN TUSSEN CONTOUR-WALLS.

Planting.

It is felt that a word should be added regarding the planting of row crops between contour structures. The easiest method is to start planting from the top, keeping the rows parallel to the higher

Chicken-Pox.*

J. D. W. A. Coles, Onderstepoort.

CHICKEN-POX is a contagious disease that occurs not only all over the Union but all over the world. It is the cause of heavy losses.

An Important Point.

An important point to be emphasized is that chicken-pox is not the same as roup (infectious coryza). Only in very recent years has this fact been realized. Roup never shows scabs on the comb, wattles or skin, and the chicken-pox vaccine will not immunize against it. Owing to past confusion, these two distinct diseases have been known by various names such as cold, catarrh, roup, diphtheria, diphtheritic roup, canker, swollen head and swollen eye.

It is true that some cases of chicken-pox show the lesions of roup only, but some fowls in the flock are almost certain to show the typical pustules and scabs on the comb, etc., if the disease is really chicken-pox.

The Cause.

Chicken-pox is due to a very small organism which can be seen distinctly only with the best microscopes. The organism enters a body cell and there multiplies to form a "colony" of hundreds of the organisms, actually within the cell. The organisms can be stained by special methods and can now be grown away from the fowl, particularly in developing chicken embryos.

Occurrence of the Disease.

Fowl-pox may occur throughout the year, but usually is at its worst from September to March. Cases in early spring usually occur in young chickens, whereas those in January to April are confined mainly to pullets bitten on the comb by mosquitoes shortly after the birds come into production.

The disease is essentially one of young birds, but even old hens may be affected. A recovered bird is usually immune for life.

Apart from the transmission by mosquitoes and blood-sucking flies, the organisms can enter susceptible fowls through small lesions in the mouth or through small wounds in the skin, due to fighting, etc.

Turkeys are very susceptible to chicken-pox. Pigeons sometimes contract the disease, but usually suffer from pigeon-pox, which is caused by another variety of the organism. Anything that lowers the vitality of a fowl makes it more susceptible to chicken-pox. Such conditions are bad hygiene, exposure to cold, wet weather, infestation with lice, red mite, tampan and worms, and bad feeding. If white instead of yellow maize is fed, and green feed is scarce, chicken-pox will be more dangerous.

Symptoms.

These are well known. Most people have seen the small whitish yellow pustules that develop later into the brown wart-like growths on the comb and wattles. There may be discharge from the nostrils, little whitish spots in the mouth, swollen and closed-up eyes, and even the common condition known as the "pip", which is a harden-

* The **STRONG FOWL-POX VACCINE** is used exclusively on healthy fowls and turkeys 1 to 3 months old.

ing of the tip of the tongue due to the fowl breathing through the mouth. If the nose is open, a fowl will not develop the "pip". Cases have been described where fowls showed only a little nasal discharge, but were ill and got "light" and finally died.

As in roup, a fowl may die of suffocation due to the entrance to the windpipe being blocked by a bit of yellowish diphtheritic material.

In odd cases the wart-like growths, following pustules, may be seen on the skin almost all over the body, especially the legs.

A solitary lesion on a fowl is sufficient to upset egg production for 3 or 4 weeks. Hence, a mild outbreak may cause considerable financial loss, even though no birds die.

Treatment.

When the lesions are confined to the comb and skin, it is probably best not to treat them at all, for no drugs act specifically on the germs, and rubbing on medicines often leads only to a spread of the infection. If the eyes and mouth are badly affected, or if the skin shows extensive lesions, it is far better to kill the bird. Occasional white particles in the mouth can be removed and the sore patches then painted with tincture of iodine or mercurochrome, and, if the eyes are not badly affected, they can be washed out twice daily with a warm boracic solution. People treating sick birds should wash their hands thoroughly in running water before handling healthy ones. It is best to isolate sick birds. Fowl-pox organisms can survive in the soil for a few weeks and can be carried on the hands, clothing and shoes of people coming into contact with cases of the disease.

Preventive Measures.

(a) Always be on the look-out for cases of chicken-pox, and do not hesitate to kill and burn badly diseased birds, unless the number affected is so large that the owner feels he must attempt to treat them.

(b) Correct defects in the hygiene.

(c) Feed properly, and supply a sufficiency of vitamin A which occurs in green feed and yellow maize. Sour skim-milk helps to build body vigour.

(d) Control internal and external parasites, including mosquitoes.

(e) Provide pure uncontaminated water.

(f) Isolate for at least two weeks all newly-purchased fowls and turkeys, and those returning from shows and competitions.

(g) Vaccinate regularly; this is the most important measure and usually has to be carried out only once during the lifetime of a bird.

Immunization.

If chickens are vaccinated *when 1 to 3 months old* and when in good health and being well fed, etc., they should not suffer from the process. Rarely, however, they show temporary retardation of growth, but the experience is that such chickens are indistinguishable from the others by the time they are four to five months old. If the fowls are inoculated when over three months old, they may "go light" and not lay well. Contrary to popular belief, there is no evidence to suggest that annual inoculation leads to the establish-

ment of chicken-pox on a farm. When all susceptible birds are inoculated more or less at the same time, the infection seems to die out soon.

Chicken-pox vaccine is issued in glass bottles, and should be used not later than 7 days after receipt. Do not expose it to direct sunlight. Shake the bottle very well before use, breaking up any sediment.

Pull the cork out and stick one end of the thick, short, double-pointed needle into the cork, the idea being to afford protection to the index finger when stabbing the skin of the bird. Disinfectants must on no account be used on the fowl's skin. Only very seldom is it necessary to wash and dry the skin before vaccination.

Instruct an assistant to hold the bird to be vaccinated, on its side with the feet towards the operator. Grasp the upper foot and pull the leg out straight. With the fingers of the left hand, part the feathers on the outside of the thigh. Dip the point of the needle into the vaccine, place the right index finger on the cork attached to the other end of the needle, and pierce the skin *once* to a depth of one-eighth of an inch. Make sure that the skin has indeed been punctured. Only one puncture must be made and consequently this way of vaccination is known as the single-stab method. As soon as the skin has been pierced once, the bird is released. It is easy to vaccinate 200 birds an hour. Always be sure that a thick film of vaccine covers the end of the needle before stabbing the skin.

A reacting bird shows a small firm swelling on the skin, up to about 4 mms. in diameter, at the inoculation site, within 5 or more days. Usually no constitutional symptoms are noted. The skin reaction is over by about the twelfth day. Unless 95 per cent. of the birds show skin reactions by the eighth or ninth day, the non-reactors should be revaccinated.

Vaccination will not cure, but only prevent, chicken-pox, and cannot be expected to help much if most of the fowls in a flock are affected, since it takes at least 14 days for immunity to develop.

The price of the vaccine is 2s. 6d. for sufficient material to vaccinate 100 chickens. Vaccine is obtainable in 100-dose bottles from the Officer-in-Charge, Allerton Laboratory, P.O. Box 405, Pietermaritzburg, Natal, or from the Onderstepoort Laboratory, P. O. Onderstepoort, Transvaal.

Although every care is taken in the preparation of the vaccine, the Department accepts no responsibility for any ill-effects which may occur as a result of its use.

If it is necessary to vaccinate birds younger than a month or older than 3 months, or birds of 1 to 3 months that are not in very good condition, the **WEAKER VACCINE** should be bought. This also is issued only in 100-dose bottles costing 2/6.

Notice.

"*Vegetable Production*" (Bulletin No. 255), the first edition of which was sold out within 3 months after publication, is now again available in revised form, and obtainable from the Editor of Publications, Department of Agriculture Pretoria. Price 1s. per copy.

Egg-Plants Resistant to Bacterial Wilt.

Dr. Vincent A. Wager, Acting Officer-in-Charge, Botanical Station Durban.

IN October 1944 the Bacterial Wilt Disease* of egg-plants or brinjals, was described in *Farming in South Africa*(¹), and seed of the wilt-resistant varieties, *Matale* and *Kopek*, that had been developed, was offered for free trial to farmers and others. Large numbers of requests for this seed were received from all parts of South Africa and growers have reported favourably on the results.

The following is a typical report: "Every plant of the susceptible *Puerto Rican Beauty* variety was affected. Of the resistant varieties, some of the *Matale* plants wilted, but only a few of the *Kopek*."

Experimental Trials.

During the past two years these resistant varieties have again been grown at the Botanical Station, Durban. They have continued to show a high degree of resistance, and each season selections were



FIG. 1.—A wilt-resistant (right) and susceptible (left) variety of egg-plant, both growing in severely infected soil.

(Photo: V. A. Wager.)

made of those plants which showed no sign of wilt although grown in severely-infected soil, and which were prolific bearers of good-sized fruit. Unfortunately, a small amount of crossing has taken place so that there may be a slight variation between some of the plants, but on the whole the two varieties may be described as follows:

Kopek.—Seed of this variety was received from Buitenzorg, Java, in 1942, and the plants have consistently shown a very high degree of resistance. The fruits are bluish-purple in colour, cylindrical, and 6 to 10 inches long by 3 inches thick.

* Due to *Bacterium solanacearum*.

Matale.—This variety came from Peradeniya, Ceylon, also in 1942, and is not quite so resistant as the *Kopek*. The plants, however, are larger, more robust, and are good bearers. The fruits are dark purple in colour and 6 inches long and 3 to 4 inches thick.

Seed for Trial.

A further supply of seed of these two varieties is available and can be obtained gratis from the writer. It is hoped that growers will select the best plants and collect enough seed for their future requirements.



FIG. 2.—Egg-plant fruits of the wilt-resistant varieties *Kopek* (above) and *Matale* (below).

(Photo: V. A. Wager.)

Further Experimental Work.

An attempt is being made to produce a variety of egg-plant that is immune to wilt and which is also a prolific bearer of large fruit. This is being accomplished by cross-pollinating different varieties

and then selecting the best offspring for a number of generations. The varieties *Kopek* and *Matale* have been crossed with one another and each with a third variety, *Terong Gowok*. The latter also came from Java and is practically immune, but has small, round, useless fruits. The progeny of these crosses are now in their third generation and the results are very promising.

General Résumé of Bacterial Wilt.

Both potatoes and tomatoes are also very susceptible to this same bacterial wilt.

The bacteria which cause this disease, thrive under hot conditions; that is, they require a soil temperature above 60° F. The trouble thus occurs during the summer months, but in frost-free areas healthy crops can be grown in infected soils during autumn, winter and spring.

Once the ground has become infected, the bacteria can remain alive in it for many years.

The disease can be introduced into healthy soil from an infected source in mud clinging to the feet of workers or farm animals, or on implements. It can also be brought in on seedlings which have been grown in infected soil, or in seed-potatoes harvested from a diseased crop.

REFERENCE.

- (1) WAGER, V. A. Bacterial Wilt of the Egg-plant. *Farming in South Africa*. 19, 223, 661-664, 1944.

The Ploughing of Contoured Lands :—

[Continued from page 406.]

contour structure. The short rows resulting from the irregularity of the strips will then terminate in the channel of the next structure and it will be found easier to turn in the channels than against the bank. Providing the structures are well made, this method will not cause serious damage to the banks.

Where a system of crop rotation with the inclusion of a perennial or close-growing annual crop is practised, the irregular strips can be eliminated entirely by planting the perennial or close-growing annual on the irregular sections and the row crops on the parallel sections, making the strips parallel first to the top contour and then to the next one in the rotation.

To many South African farmers contour farming is something new, and they will find it difficult at first to get accustomed to curves, but when once they have worked out a system to overcome their particular difficulties, especially with regard to teaching their native labourers entirely new methods, their pride in such achievement will be all the greater, quite apart from the other numerous advantages which contour farming will confer.

REFERENCES.

- Terracing for Soil and Water Conservation. Farmers' Bulletin No. 1789, U.S. Dept. Agric.

Temperature of Milk on Arrival at the City Dairy.

S. Bakalor, Agricultural Research Institute, Pretoria.

MILK is a highly perishable foodstuff, being subject to various changes such as souring or curdling, caused by bacteria with which it can readily be contaminated. Temperature plays a considerable rôle in the multiplication of bacteria in milk and in the changes they cause in the chemical composition of the product. When milk is cooled to a low temperature immediately after it has been drawn from the udder, and kept at very low temperatures until consumed, bacterial development will be very slow. Data quoted by Hammer (1938) show that bacteria in freshly-drawn milk held at a temperature of 40° F. increased very slowly, whereas at 50° F. bacterial growth was considerably more rapid, and at 60° F. and 70° F. multiplication of organisms was enormously increased.

Apart from the fact that milk, which has not been properly cooled on the farm, may contain more bacteria per c.c. than is permitted under the public health regulations of municipalities, the producer may also suffer financial loss through his supplies turning sour on the journey to town and thus being rejected by the distributor. Pullinger (1944) found that the average percentage loss per farmer as a result of souring of milk sent to Johannesburg distributors, during the months October to March, inclusive, was 4.4 per cent. In October 1943, the Johannesburg Producers' Pool lost 15,000 gallons of milk through souring, out of a total volume of 206,000 gallons handled. He gives data to show that much of this loss is due to inadequate cooling and cold-storage facilities on farms.

Results of Investigation Conducted.

In order to obtain more information about the standard of cooling methods on farms from which supplies are sent to the city milk market, an investigation was made by the Agricultural Research Institute on the temperatures of incoming consignments of milk at a city dairy plant during the hot summer months. On one day per fortnight during the period 29 October 1944 to 26 February 1945, the temperatures of consignments of milk received at a local plant were taken. The temperature of each lot of milk was recorded as it was dumped into the weighing vat. At this particular plant most of the producers sent in milk twice daily. A large percentage of the incoming supplies, however, consisted of mixed morning and evening milk, which was sent in only once a day.

Altogether 507 temperature readings were made. The temperatures of the various lots of milk ranged from 51° F. to 96° F., with a mean of 74.3° F. Further details in regard to the temperature range are given in Table I.

From the figures given it is clear that a large proportion of the supplies arriving at the plant was inadequately cooled. Over 70 per cent. of the consignments, and of the weight of milk, arrived at a temperature of 70° F. or above. Hammer (1938) states that in milk held at temperatures approximating 70° F. conditions are very favourable for the growth of *S. lactis*, a bacterial species largely responsible for normal souring in milk. Organisms of the *Escherichia-aerobacter* species (commonly known as *B. coli*) are also very active at this temperature and produce gas as well as acid. These latter species, usually excreted in the faeces of cows, are often the

cause of stable odour and flavour in milk. At temperatures between 80° F. and 99° F. (the range for over 25 per cent. by weight of the milk), the development of these acid and gas-producing organisms is extremely rapid.

TABLE I.—*Percentage of total number of consignments and percentage of total weight of milk falling into temperature ranges shown.*

Temperature Range (°F.).	Percentage of—	
	(a) Total No. of Con-signments.	(b) Total weight of Milk.
50-54	1·8	5·9
55-59	2·8	3·3
60-64	12·1	12·4
65-69	9·3	8·2
70-74	29·4	24·4
75-79	23·3	20·6
80-84	9·6	9·5
85-89	6·3	8·1
90-94	5·3	7·0
95-99	0·1	0·6
	100·0	100·0

The growth of bacteria in milk at any particular temperature is dependent on the length of time the milk is held at this temperature. In Tables II and III, the temperatures of milk received twice and once daily are given.

(a) *Supplies received twice a day.*—The mean temperatures for milk received twice a day on the particular dates on which supplies were examined, as well as for the whole period, are given below.

TABLE II.—*Mean temperatures of supplies received twice a day.*

Date.	Milk received in—	
	Morning.	Evening.
	(°F.)	(°F.)
29/10/1944.....	70·5	77·7
6/11/1944.....	73·3	77·7
20/11/1944.....	72·1	73·3
4/12/1944.....	74·0	79·5
18/12/1944.....	73·3	80·7
2/1/1945.....	74·0	84·1
15/1/1945.....	71·0	83·9
29/1/1945.....	73·7	76·5
12/2/1945.....	74·0	81·8
16/2/1945.....	72·2	84·0
Whole period.....	72·9	77·7

It will be noted that on all occasions the evening milk was much warmer than the corresponding morning milk. The air temperatures at the time of the early morning milking are naturally lower than those at the time of the late afternoon milking. In addition, it was found that a number of large producers, who had their own motor

TEMPERATURE OF MILK ON ARRIVAL AT CITY DAIRY

transport, apparently made no attempt to cool their evening supplies, but despatched the warm milk soon after milking was completed. The temperatures of such supplies were usually above 90° F., and at times as high as 95 to 96° F. At these high temperatures conditions are ideal for the growth of bacteria.

The mean temperatures of the supplies of individual producers in the group which sent milk to the dairy twice daily, ranged from 59·9° F. to 87·7° F. Nearly all the milk had an average temperature above 70° F. The supplies in most cases were sent in by train, the average rail distance of the farms from the town being about 20 miles. According to information received from some of these producers, the time taken to transport the milk from the farms to the dairy plant was about 2 to 2½ hours. The age of the milk on arrival ranged from 4 to 5½ hours.

(b) *Supplies received once a day only.*—Most producers in this group sent in their daily supplies during the morning. The temperatures for this group are given in Table III:—

TABLE III.—*Mean temperatures of supplies received once a day.*

Date.	Milk received in—	
	(a) Morning only.	(b) Evening only.
	(°F.)	(°F.)
29/10/1944.....	65·1	70·0
6/11/1944.....	71·7	73·0
20/11/1944.....	68·0	71·5
4/12/1944.....	68·0	70·0
18/12/1944.....	69·0	74·0
2/ 1/1945.....	68·0	72·0
12/ 1/1945.....	68·5	71·0
29/ 1/1945.....	68·2	67·0
12/ 2/1945.....	69·8	71·0
26/ 2/1945.....	65·5	61·0
Whole period.....	68·3	71·1

In this case it will be observed that, as in the case of two daily deliveries, the supplies received in the morning were cooler than those received in the evening. The variation in air temperatures between night and day was probably the cause of this difference, as the morning receipts in this case consisted of the previous evening's milk, held overnight, and the morning's milk. The evening receipts consisted of the morning and afternoon milk produced on that day.

The mean temperatures for the supplies of individual producers in this group ranged from 53·7 to 79·8° F. More than half of these means or averages were above 70° F. In certain cases, supplies took from 13 to 16 hours to reach their destination, and were transported 75 to 85 miles by rail. In several instances, supplies had to be transferred from one train to another. Much of this milk which had been transported over long distances, was, on receipt, rejected as sour.

A large number of suppliers who sent in milk once daily were no further from the city dairy than farmers who sent in milk twice a day. In nearly every case, however, where milk was sent in once a day only, a portion of the supplies was well over 24 hours old by the time it reached the dairy.

Need for Improvement of Cooling Methods.

The high temperatures given in the above tables reveal how very unsatisfactory the methods of cooling must be on many farms. Except in a few cases where farmers supplying this dairy had installed cooling and refrigerating machinery, it was learnt that only water coolers were used. Water alone cannot cool milk to a temperature lower than a few degrees above the temperature of the water itself. Since, during the summer months, water from boreholes and wells approaches temperatures as high as 70° F. and even higher, it is obvious that the use of this water does not enable the producer to cool his milk efficiently.

Freshness and purity are of the greatest importance in milk intended for city consumption. Certain producers appear to be under the impression that if they send in supplies to a pasteurizing plant, they can neglect to cool the milk to a low temperature on the farm. It must be pointed out that dairies have to exercise as great care in selecting supplies for pasteurization as in the selection of raw milk. Milk which shows an acidity in excess of 0.18 per cent. has to be rejected owing to the danger that it might coagulate when held at pasteurizing temperatures. The present demand is for milk of greater purity and of a higher quality. It is therefore essential that inspection and selection on the receiving platform be carried out even more carefully and systematically than is the practice to-day. At many plants milk is accepted or rejected merely on flavour and aroma.

In the area in which the foregoing supplies were produced, the mean air temperature during the summer months is about 70° F. and the mean maximum temperature is above 80° F. Under such circumstances milk should be cooled to a temperature approaching 40° F. on the farm in order that it should arrive in a satisfactory condition at the city dairy.

In regard to single daily deliveries, it will be in the interest of producers who are not too far from town to send in milk twice a day. Producers who are further distant and who desire to send their supplies to town, must be prepared to install refrigerating and cooling units on their farms, in order to be able to cool and store the milk at low temperatures. Milk should reach the consumer as soon as possible after it has been produced.

It is recommended that milk-plants should record the temperatures of all supplies on arrival. It is advisable that supplies arriving at temperatures higher than 60° F. be analyzed bacteriologically, and, if it is proved to be unsatisfactory, the producer should be notified that his milk will not be accepted until its quality is improved and up to standard.

Water-cooling of milk for the city market must obviously be superseded by mechanical cooling in which refrigerants are used to enable the milk to be cooled to low temperatures. The initial outlay for the purchase of the necessary equipment will be repaid in the avoidance of future souring losses and in the improved quality of the milk bacteriologically.

REFERENCES.

- (¹) HAMMER, B. W. (1938)—*Dairy Bacteriology*, John Wiley and Sons, New York.
- (²) PULLINGER, E. J. (1944)—*The Milk Industry of South Africa*. J.I.S.A.V.M.A. XV(2). 39-63

Karakul Sheep for Sale.

20 Karakuls and 40 Karakul Persian Crossbred Sheep
to be sold by

PUBLIC AUCTION

at the

Grootfontein College of Agriculture,
Middelburg, C.P.

Tuesday, 25 June 1946
at 10 a.m.

9 Karakul Rams.
11 Karakul Ewes.
40 Karakul Persian Crossbred ewes.

Further Particulars obtainable from the Principal.

SALE OF SURPLUS LIVESTOCK

at

Potchefstroom College of Agriculture.

The following surplus livestock will be sold by public auction
at the Institution at 10 a.m. on 26 June, 1946.

- 1 Donkey Jack, 2 years—son of Joe Louis.
- 13 Donkey Jennies, 1½ to 4 years; and 2 Foals.
- 2 Mares (Thoroughbred × Boer Horse), about 4 years.
- 2 Fillies (Percheron × Boer Horse), about 18 months.
- 14 Afrikander Bulls, about 2½ years.
- 2 Friesland Bulls.
- 1 Jersey Bull.
- 2 Guernsey Bulls.
- 14 Merino Rams.
- 8 Crossbred Rams.
- 6 Slaughter Oxen.

Particulars in connection with the above animals are obtainable
from the Principal.

The College of Agriculture reserves the right to withdraw any
animal prior to the sale.

Blowfly Spray for Sheep and Cattle.

THE Division of Veterinary Services offers a spray for the treatment of wounds on animals infected with the maggots of blowflies, ordinary wounds and for local application against ticks.

It is a well-established fact that the cattle screw-worm (*Chrysomya bezziana*), which lays its eggs in wounds on cattle in the low-veld and bushveld areas, breeds only in wounds on living animals and does not occur in carcasses and can consequently not be caught in traps baited with meat or other baits normally attractive to blowflies. It is very important, therefore, to destroy all maggots in wounds and thus prevent their further development.

The most important blowfly attacking sheep in the Union (*Lucilia cuprina*) has been shown to have acquired similar habits and makes very little use of carcass material for breeding. It is consequently equally important to destroy all maggots infecting sheep.

The maggots of the screw-worm complete their development in wounds in from five to seven days, and those of the sheep blowfly in about three days. Cattle should, therefore, be examined and treated at least once a week, and sheep twice a week, to ensure that all maggots are destroyed. It is essential that a remedy be used which will ensure the destruction of *all* maggots, since, if only 5 per cent. should escape, sufficient flies will develop to maintain the species and ensure the continuation of the pest.

The practice of using remedies which do not give 100 per cent. kill and of applying just any remedy after the wool has been shorn from an infected area—thus allowing many maggots to escape—is most undesirable.

The blowfly spray is best sprayed undiluted by means of a hand spray of the Enots type (not obtainable from Onderstepoort) or sprinkled over the infected area before or *while* the wool is clipped off. No live maggots should be allowed to escape. The spray kills the maggots almost instantaneously and promotes rapid healing of the wound, thus reducing its attractiveness and preventing reinfection. The maggots infecting wounds on cattle must be killed by spraying a small quantity of the spray deeply into the wound before any attempt is made at their removal. Thereafter the wound should be cleaned by removing any blood clots and foreign material present, and again lightly sprayed to ensure rapid healing.

Blowfly spray is extremely lethal for ticks but very light spraying on cattle is recommended as the skin may be irritated by heavy applications under certain conditions.

The spray is volatile and inflammable and must be handled very carefully. It is a carefully balanced solution which will keep indefinitely if stored in tightly closed containers. It is sold ready for use, and should, therefore, not be diluted with either oil or water.

As from 1 June 1946 blowfly spray will be issued in the following packings:—

(a) 1-gallon tins (non-returnable) 6s.; (b) 5-gallon drums (non-returnable) 23s.; (c) in owner's drum at 3s. 6d. per gallon.

Only empty drums with a capacity of from 25 to 45 gallons will be received for refilling—no smaller drums sent will be refilled. The 1- and 5-gallon containers become the property of the buyer and must not be returned for refilling.

Empty drums of from 25 to 45 gallons' capacity must be railed to Pretoria North station, carriage paid, and must—

- (1) be clean and dry inside;
- (2) have the owner's name and address clearly painted on the outside; and
- (3) be provided with a screw plug capable of securely sealing the contents.

No repairs of leaky drums can be undertaken at Onderstepoort and dirty drums which are likely to affect the quality of the spray will not be refilled. The Director of Veterinary Services reserves the right of deciding whether a drum is suitable for refilling or not.

The 1- and 5-gallon non-returnable containers for blowfly spray are obtainable at the prices quoted above, carriage paid, from the following addresses: Officer-in-Charge, Veterinary Research Laboratory, P.O. Box 405, Pietermaritzburg (telegraphic address: "Bacteria, Pietermaritzburg"); the Officer-in-Charge, Veterinary Research Laboratory, P.O. Box 41, Grahamstown (telegraphic address: "Institute, Grahamstown"); the Senior Veterinary Officer, Bloemfontein; the Senior Veterinary Officer, Cape Town; and the Senior Veterinary Officer, East London.

The spray is issued only on pre-payment or C.O.D., and is forwarded *only by rail or road motor service*. It will be to the advantage of purchasers to remit cash with order to obviate the payment of C.O.D. charges. Cheques, etc., must be made payable to the Director of Veterinary Services.

When replying to a letter or telegram, always quote the reference number and date.

No credit is allowed for spray returned, unless it is found fit for re-issue. Every case is treated on its merits and the decision of the Director of Veterinary Services is final.

Ask for a Price List of Laboratory Products and note the correct addresses.

Although the utmost care is taken in the preparation of this spray, no guarantee is given regarding its safety or efficacy, nor will any compensation be paid for deaths or accidents which may follow its use.

(Division of Veterinary Services.)

SHORTAGE OF TETROL.

THE Director of Veterinary Services, Onderstepoort, announces that owing to the shortage of one of the ingredients of tetrol it is at present no longer possible to prepare supplies of this remedy. In view of the prevailing war conditions, it is extremely difficult to say when supplies will be available again, but as soon as this Institution is able to resume the preparation of tetrol, the necessary notification will be given in regard to the matter.

Farmers are therefore requested not place any further orders since any money forwarded must merely be refunded.

Farming is a Business :—

[Continued from page 384.]

As has been pointed out before, however, this reward does not drop from the skies. It demands both time and concentration. In the first place it requires knowledge of double entry book-keeping. In addition, use must be made of the Labour Record and all the other cost records, i.e. the records of *Draught Animal Costs*, *Machine Costs*, *Implement Costs* as well as *Feedstuffs and Grazing Records*.

If the double entry system of book-keeping is adopted, the cash postings can be carried over in the form of a summary from the Cash-book and Credit books to the *Analysis of the Total Farm Receipts and Expenses*. These totals are subsequently recorded in the *Summerizing Statement* together with the figures from the various cost distribution statements. Only then is the process concluded in the *Final Summary Statement*.

For the time being this article concludes the series of articles on "Farming is a Business". Readers are advised, however, to look out for a later series which will furnish information on the future plans of the Division in connection with book-keeping and costs.

Gammexane and D.D.T. Dips for Control of Arsenic-Resistant Blue Tick :—

[Continued from page 366.]

How they can best be used in the tank; the rôle of arsenic as a possible preservative; their efficacy against other ticks, cattle lice, mange, etc; the application of a practical method for testing; the most economical dilutions and several other points—all these are questions that need further accurate investigation.

At the conclusion of the present series of experiments, however, many of these questions ought to be elucidated.

REFERENCES.

- (*) DU TOIT, R., GRAF, H., AND BEKKER, P. M. (1941).—Resistance to Arsenic as Displayed by the Single-host Blue Tick, *Boophilus decoloratus* (Koch), in a Localised Area of the Union of South Africa, *Jl. S.A. Vet. Med. Ass.*, No. 12, pp. 50-58.
- (*) BEKKER, P. M. (1945).—Use of Waste Tobacco in Dips, *Farming in South Africa*, Jan. 1945.
- (*) BEKKER, P. M., AND KOCH, P. (1943).—Growing Tobacco for Dipping Purposes, *Farming in South Africa*, Oct. 1943.
- (*) BEKKER, P. M.—Tobacco Extract for Control of Arsenic-Resistant Blue Tick and Cattle Lice, *Farming in South Africa*, Dec. 1944.

Crops and Markets

A Statistical and Economic Review of South African Agriculture

by

The Division of Economics and Markets

Volume 25

JUNE 1946

No. 286

CONTENTS

	PAGE
Price Review for April 1946	421
Index of Prices of Agricultural and Pastoral Products	422
Index of Prices paid for certain Farming Requisites	422
Marketing of the 1945-46 Maize Crop	423
Maximum Prices of Citrus Fruit: 1946-47 Season	423
Agricultural Conditions in the Union during April 1946	424
Maximum Prices of Eggs in Uncontrolled Areas	424
Producers' Prices of Wheat, Oats, Rye and Barley: 1946-47 Season	425
Price Tables and Index	425
Control of Kaffircorn Repealed	426

Price Review for April 1946.*

Fruit.—Moderate consignments of apples and grapes were received throughout the month. The prices of good quality apples were high and increased considerably towards the end of the month. The Johannesburg market was well supplied with papaws, avocados and guavas, and sales throughout were firm. Prices still showed increases. In the case of avocados, prices increased from 2s. 8d. per tray in March to 3s. 4d. per tray in April. The other markets were reasonably supplied with tropical fruit, although offerings steadily decreased towards the end of the month. Although the supply increased, bananas still remained scarce and dear. On the Cape Town market prices increased from 69s. 7d. per crate in March to 75s. 5d. per crate in April, and on the Johannesburg market from 17s. 3d. per crate in March to 29s. 5d. in April.

Vegetables.—The markets were reasonably supplied with vegetable varieties and because of a constant demand, good prices were realized. Carrot and cauliflower offerings decreased during the month, and prices increased. On the Johannesburg market carrot prices increased from 8s. 10d. per bag in March to 10s. 2d. per bag in April; on the Cape Town market from 8s. 1d. to 9s. 3d.; and on the Durban market from 23s. 10d. to 24s. 2d.

Tomatoes.—In general the markets were well supplied with tomatoes and prices showed few changes. The Johannesburg market was well supplied with lowveld tomatoes, and the other markets with local supplies.

* All prices mentioned are averages.

Onions.—Unchanged consignments of good quality were always available. In comparison with the previous month, Transvaal as well as Cape Onions showed an increase in prices. On the Pretoria market the prices of Cape onions increased from 12s. 10d. per bag in March to 13s. 10d. per bag in April; on the Cape Town market from 9s. 9d. to 11s. 3d.; on the Durban market from 13s. 5d. to 14s. 9d.; and on the Johannesburg market from 12s. 4d. to 12s. 10d.

Potatoes.—Reasonable consignments reached the markets, and prices throughout were higher than those of the previous month. The majority of the offerings of potatoes realized the maximum fixed prices. Buyers were interested mostly in Grade 1 potatoes which sold very satisfactorily.

Sweet Potatoes.—Good supplies reached the markets, and good prices were realized. Prices on the Durban market increased considerably in comparison with those of the previous month, e.g. from 14s. 8d. per bag in March to 17s. 4d. per bag in April. On the Johannesburg market prices decreased from 18s. 5d. per bag in March to 15s. 2d. per bag in April.

Eggs and Poultry.—Egg supplies were insufficient for the demand and prices were high. Further increases in the maximum wholesale and retail prices of eggs were announced towards the end of March. The markets were well supplied with fowls, ducks and turkeys, but geese and muscovies were scarce.

Fodder.—The Johannesburg market was well supplied with teff, sweet grass and lucerne. On the other markets supplies decreased.

Index of Prices of Agricultural and Pastoral Products.

THIS index (see Table elsewhere in this issue) increased from 171 in March to 174 in April. The most important changes which occurred in the various groups are the following:—

(a) *Hay* (i.e. lucerne and teff) which increased from 160 in March to 176 in April as a result of an increase in the market price of lucerne.

(b) *Other field crops* (i.e. potatoes, sweet potatoes, onions and dry beans) which increased from 283 in March to 299 in April as a result of the increases in the market prices of potatoes and onions.

(c) *Slaughter Stock* (i.e. cattle, sheep and pigs) which decreased from 171 in March to 168 in April as a result of the further seasonal decrease in the price of cattle.

(d) *Poultry and poultry products* (i.e. fowls, turkeys and eggs) which increased from 277 in March to 321 in April as a result of increases in the prices of eggs and fowls.

Index of Prices paid for certain Farming Requisites.

A TABLE indicating the quarterly index of prices of a few important farming requisites appears elsewhere in this issue.

The index for bags showed the greatest decrease, namely, from 314 in January to 304 in April, as a result of the decrease in the prices of wool bags and grain bags.

Marketing of the 1945/46 Maize Crop.

THE following are the prices per bag which producers will receive for the 1945-46 maize crop, namely, from 1 May 1946.

(Corresponding prices.)

	Grades 2, 4 and 6.	Grades 3, 5 and 7.	Grade 8.
	s. d.	s. d.	s. d.
In bags—			
1945/46.....	22 6	22 4	22 1
1944/45.....	19 0	18 10	18 7
In elevator—			
1945/46.....	21 2	21 0	20 9
1944/45.....	17 11	17 9	17 6

These prices are free on rail producer's station.

For seed maize a minimum price of 26s. 6d. per bag has been fixed as against a minimum price of 21s. 6d. per bag for the previous season.

Maize prices for resale have been fixed at 20s. 2d. per bag (200 lb.) for grades 2, 4 and 6; 20s. per bag for grades 3, 5 and 7 and 19s. 9d. per bag for grade 8. For maize in elevators the prices are 2s. per bag lower in each case. These prices are 1s. per bag higher throughout than the corresponding prices of the previous season.

Upon resale the actual railage, but at the most 1s. per bag, may be added to the above prices for maize sold in the Cape Province, Natal and the districts Letaba, Pietersburg, Pilgrimsrust or Zoutpansberg in the Transvaal, and at the most 9d. per bag for maize sold elsewhere in the Union. Upon further sale and consignment a further amount, representing the actual railage, may be added, but at the most 6½d. per bag, notwithstanding the place at which the maize is sold.

The prices of maize products have also been fixed throughout at 1s. per bag higher than those of the previous season.

Producers' prices are therefore 3s. 6d. per bag higher than during the past season, while consumers' prices have been increased by only 1s. per bag.

Similarly, as in the past season, the difference is again supplemented by a subsidy from the Government.

Last season the price on which consumers' prices were based was calculated at 16s. 6d. per bag for the best grades, while the price received by producers was 19s. per bag. A subsidy of 2s. 6d. per bag was then paid by the Government. The basic price for the present season has been increased to 17s. 6d. per bag, and thus the prices to the consumer have also been increased by 1s. per bag. The producer's price is, however, 22s. 6d. per bag. Consequently, a subsidy of 5s. per bag will be paid by the Government for the coming season.

Maximum Prices of Citrus Fruit : 1946/47 Season.

THE prices for the 1946-47 citrus season came into operation on 12 April 1946. In comparison with the past season a further change has been made between "Large" and "Extra Large" in the case of oranges and grapefruit.

Last season the Citrus Board virtually controlled only the marketing and the export producers. This season the Board will again

control all oranges, grapefruit and lemons of exporters, as well as of non-exporters who produced at least 1,000 pockets for sale during the three preceding seasons.

The prices which producers will receive for oranges for the present season in comparison with those of the previous season are as follows:—

	Producers' Prices of Oranges per Pocket.	
	1946.	1945.
Grade 1—	s. d.	s. d.
Extra large.....	3 9	—
Large.....	3 6	3 0
Medium.....	3 3	2 9
Grade 2—		
Extra large.....	3 0	—
Large.....	2 6	2 6
Medium.....	2 3	2 3
Small.....	1 9	1 9

Agricultural Conditions in the Union during April 1946.

Rainfall.—Scattered showers occurred in the south-western, south-eastern and Border areas of the Cape Province. Good rains fell in the north-western Cape Province and in the Karoo. Scattered showers also occurred in the Transkei, Natal and certain parts of the Orange Free State.

Condition of stock.—As a result of the general rains, grazing for stock was reasonably satisfactory, and the condition of stock fairly good. Stock diseases were generally quiet, although lumpy skin disease became more widespread. Nagana and gallsickness also caused stock losses.

Crops.—Summer crops in general are promising and reasonable crops are expected. As a result of the rains which occurred, farmers were able to sow a considerable amount of wheat, and the prospects for winter crops appear to be promising.

Maximum Prices of Eggs in Uncontrolled Areas.

PREVIOUSLY maximum prices of eggs were fixed only for the controlled areas in the Union, namely, the areas given in the footnote to Government Notice No. 722 of 29 March 1946. For the remainder of the Union no price control existed in regard to the sale of eggs.

As from 12 April 1946, however, a maximum price at which eggs may be sold by any person throughout the Union (except in controlled areas), was fixed, namely, at 3s. 8d. per dozen.

See *Government Gazette Extraordinary* of 12 April 1946.

Producers' Prices of Wheat, Oats, Rye and Barley: 1946/47 Season.

As was previously the case, the prices which producers will receive for wheat and other winter cereals during the coming season 1946-47 were announced in advance, namely, in April of this year.

Producers will receive 40s. 6d. per bag for Class B grade 1 wheat during the coming season.

The corresponding price for the previous season was 37s. 6d. per bag. The higher price for the coming season was granted to encourage further the production of wheat.

The price of rye has been fixed at 27s. 6d. per bag (200 lb.) for grade 1 as against 25s. per bag for the previous season; malted barley grade 1 (viz. Class A Six-row malted barley) 25s. per bag (150 lb.) as against 21s. per bag for the previous season; grade 1 fodder barley (viz. Class C barley) 15s. 6d. per bag (150 lb.) as against 12s. 7d. per bag for the previous season; and grade 1 fodder oats (Class B) 15s. 6d. per bag (150 lb.) as against 12s. 7d. per bag for the previous season.

Prices of Avocados and Papaws on Municipal Markets.

SEASON.	AVOCADOS (Per Tray). (a)				PAPAWS. (b)							
	Cape Town.	Durban.	Johannesburg.		Cape Town Std. Box.	Durban. Tray.	Johannesburg.		Port Elizabeth Std. Box.	Bloemfontein Std. Box.		
			Ordinary.	N.M.			Ordinary Std. Box.	N.M. Std. Box.				
1933-39.....	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1939-40.....	1 6	0 11	1 3	1 11	2 0	0 10	1 7	2 0	2 0	1 8	1 8	1 8
1940-41.....	2 1	1 2	1 9	2 11	2 3	0 10	1 4	1 9	1 11	1 6	1 6	1 6
1941-42.....	1 10	0 10	1 5	2 4	2 1	1 1	1 9	2 2	2 3	1 9	1 9	1 9
1942-43.....	2 4	1 7	2 1	3 4	2 5	0 10	1 10	2 1	1 11	2 0	2 0	2 0
1943-44.....	3 1	1 8	2 10	4 3	3 2	1 2	2 1	2 7	2 2	2 0	2 0	2 0
1944-45.....	4 1	1 6	3 7	5 3	3 2	1 5	2 5	3 5	3 3	2 7	2 7	2 7
1945.....	—	—	—	—	3 4	1 6	3 1	4 1	3 5	3 0	3 0	3 0
1946—												
January.....	3 11	—	4 10	7 2	3 10	1 5	4 1	4 9	6 5	3 6	3 6	3 6
February.....	2 0	2 3	2 6	4 3	2 8	1 10	5 11	7 6	—	5 5	5 5	5 5
March.....	2 0	0 11	2 3	4 4	4 10	1 10	5 4	6 9	—	4 10	4 10	4 10
April.....	1 10	0 10	2 7	3 11	4 9	1 8	4 5	6 2	4 11	4 6	4 6	4 6
May.....	2 4	0 9	2 5	4 3	4 7	1 6	3 7	5 0	4 7	2 11	2 11	2 11
June.....	2 4	2 5	2 10	6 1	4 4	1 11	3 7	4 6	4 0	3 6	3 6	3 6
July.....	3 4	2 4	3 10	5 8	4 2	1 9	4 10	5 9	4 11	5 0	5 0	5 0
August.....	6 8	3 10	6 2	7 4	5 10	1 5	4 10	6 1	5 3	5 0	5 0	5 0
September.....	5 4	3 1	6 5	7 0	3 3	1 4	3 3	4 1	2 7	3 6	3 6	3 6
October.....	7 2	3 8	8 1	7 4	2 7	1 5	2 5	3 5	2 2	2 4	2 4	2 4
November.....	9 5	3 6	6 6	8 0	3 6	2 0	2 7	3 7	6 7	3 2	3 2	3 2
December.....	7 8	1 0	7 1	—	4 4	1 0	3 11	5 7	5 10	3 6	3 6	3 6
1946—												
January.....	3 1	1 3	5 10	9 2	3 10	1 6	4 5	7 11	6 4	3 11	3 11	3 11
February.....	3 4	0 10	3 1	5 0	2 10	1 5	7 1	5 6	5 6	4 7	4 7	4 7
March.....	2 11	3 7	2 8	4 0	—	1 1	6 6	7 8	6 4	5 8	5 8	5 8
April.....	2 8	1 11	3 4	4 9	5 5	1 1	5 6	7 11	6 3	4 6	4 6	4 6

(a) Season 1 January to 31 December.

(b) Season 1 April to 31 March.

Control of Kaffircorn Repealed.

LAST season (1944-45) the Government requested the Maize Control Board to apply control measures to the marketing of kaffircorn. As the crop was relatively small, however, and the supply greatly exceeded the demand, considerable difficulty was experienced in the application of control.

The Board actually received only 165,000 bags of the portion of the crop which was marketed.

In view of the experience of the past season and the fact that this year again a relatively small crop of about 600,000 bags is expected, the Government, on the recommendation of the Board, decided to repeal the control of kaffircorn. There will therefore be no price fixation, and imports of all sorghums may be executed without permits.

Index of Prices Paid for Farming Requisites.

Year and Month.	Imple-ments.	Ferti-lizers.	Fuel.	Bags.	Feeds.	Fencing Material	Dips and Sprays.	Building Material.
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
Basis—								
1936-38...	100	100	100	100	100	100	100	100
1942.....	123	157	140	206	136	229	117	168
1943.....	144	171	154	237	152	239	127	179
1944.....	161	184	156	307	155	240	134	184
1945—								
January...	159	204	156	310	162	225	136	181
April.....	159	204	156	311	163	224	136	181
July.....	159	204	156	321	169	225	135	180
October....	159	204	146	321	166	225	135	179
1946—								
January...	155	204	146	314	168	218	135	174
April (j)...	152	204	146	304	163	215	134	175

The following is the composition of the above groups. (The items are weighted according to their respective importance):—

- (a) Ploughs, planters, seed-drills, harrows, cultivators, ridgers, mowers, binders, hay rakes, silage cutters, hammer mills, separators, windmills, shares, land sides, mouldboards, mowers, knives, pitmans, guards.
- (b) Superphosphate, ammonium sulphate, muriate of potash.
- (c) Petrol, power paraffin, crude oil, grease, lubricating oil.
- (d) Woolpacks, grain bags, sail twine, binder twine.
- (e) Mealies, oats, lucerne, groundnut oil-cake meal, bonemeal, salt.
- (f) Fencing wire, standards, baling wire.
- (g) Bordeaux mixture, lime sulphur, arsenate of lead, cyanogas, Cooper's sheep dip, Little's dip, Tixol cattle dip.
- (h) Corrugated iron, deals, cement, lime, flooring boards.
- (j) Preliminary.

CROPS AND MARKETS.

Index of Prices of Field Crops and Animal Products.

(Basic period 1936-37 to 1938-39=100.)

SEASON (1 July to 30 June).	Summer cereals.	Winter cereals.	Hay.	Other field crops.	Pastoral products.	Dairy products.	Slaughter stock.	Poultry and poultry products.	Com- bined index.
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	
WEIGHTS.	19	13	2	3	34	6	17	6	100
1938-39.....	92	107	96	89	79	102	106	92	93
1939-40.....	86	107	77	95	115	105	106	89	103
1940-41.....	109	113	106	156	102	108	110	104	108
1941-42.....	121	134	143	203	102	131	134	145	123
1942-43.....	160	149	144	159	122	147	167	173	146
1943-44.....	169	172	137	212	122	154	182	204	157
1944-45.....	184	183	160	280	122	177	172	187	163
1945—									
January.....	184	183	177	250	122	159	173	206	163
February.....	184	183	171	235	122	180	171	225	164
March.....	184	183	182	245	122	180	171	237	165
April.....	184	183	173	246	122	180	169	263	166
May.....	199	183	173	287	122	184	163	272	170
June.....	199	183	190	320	123	184	170	262	172
July.....	199	183	191	315	118	210	175	210	170
August.....	199	183	191	333	118	210	179	180	169
September.....	199	183	187	372	118	210	183	165	170
October.....	199	183	189	383	118	210	187	165	171
November.....	199	190	194	379	118	204	187	173	172
December.....	199	190	194	341	117	204	183	202	172
1946—									
January.....	199	190	191	349	118	204	179	233	174
February.....	199	190	158	308	118	186	175	256	171
March.....	199	190	160	283	118	186	171	277	171
April.....	199	190	176	299	118	186	163	321	174

(a) Maize and kaffircorn.
(b) Wheat, oats and rye.
(c) Lucerne and tait hay.

(d) Potatoes, sweet potatoes,
onions and dried beans.
(e) Wool, mohair, hides and skins.

(f) Butterfat, cheese milk and
condensed milk.
(g) Cattle, sheep and pigs.
(h) Fowls, turkeys and eggs.

Average Prices of Cabbages, Cauliflower and Tomatoes on Municipal Markets.

SEASON (1 July to 30 June).	CABBAGES (Bag). (a)			CAULIFLOWER (Bag). (a)			TOMATOES (Trays 15 lb.).			
	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.	Johannesburg.			
							N.M. No. 1.	Other.	Cape Town.	Durban.
1938-39.....	s. d. 3 10	s. d. 3 0	s. d. 3 10	s. d. 3 0	s. d. 1 8	s. d. 3 5	s. d. 2 2	s. d. 1 3	s. d. 1 8	s. d. 0 10
1940-41.....	5 10	4 8	7 1	3 11	4 3	5 3	2 7	1 6	2 1	1 2
1941-42.....	8 10	5 5	11 5	5 9	5 7	7 11	3 1	1 9	2 3	1 6
1942-43.....	5 6	5 11	9 1	5 0	5 9	7 6	3 4	1 10	2 1	2 7
1943-44.....	11 1	7 4	17 6	9 2	6 2	12 1	5 5	2 9	3 7	2 0
1944-45.....	9 7	6 11	13 5	7 5	6 6	9 8	4 1	2 0	2 8	1 9
1945—										
January.....	8 0	4 9	15 8	6 3	—	—	6 1	2 6	2 7	2 2
February.....	7 8	8 6	22 4	9 5	6 11	—	3 0	1 2	3 1	1 1
March.....	8 5	10 5	24 1	8 8	—	8 0	3 4	1 5	2 5	2 4
April.....	8 7	7 11	14 8	7 7	9 7	11 4	3 4	1 5	2 6	1 7
May.....	7 6	5 4	11 2	7 3	6 5	10 10	4 0	1 10	2 4	1 10
June.....	8 11	4 3	10 6	11 7	7 7	14 10	3 11	2 1	3 0	1 1
July.....	12 2	5 4	11 0	12 3	5 7	11 0	3 7	1 10	2 9	1 2
August.....	12 0	9 7	8 11	10 0	8 2	12 3	5 2	3 2	3 4	1 5
September.....	12 2	11 7	10 8	11 8	9 6	14 10	6 7	3 1	3 10	1 10
October.....	10 1	12 1	16 3	17 0	5 9	11 0	6 2	2 8	3 1	1 8
November.....	10 9	9 11	16 0	12 9	8 6	—	5 7	2 8	4 0	1 6
December.....	14 2	9 10	17 7	26 0	3 6	—	3 0	1 1	3 11	1 1
1946—										
January.....	9 7	8 0	14 8	14 5	9 0	—	4 3	1 10	2 5	1 3
February.....	7 3	9 1	18 1	10 10	6 6	—	4 2	1 7	1 11	1 3
March.....	8 11	7 3	14 4	7 2	9 8	3 4	6 2	3 8	2 6	1 6
April.....	9 10	5 8	9 0	6 7	15 4	12 4	8 1	3 6	2 8	2 0

(a) Weights of bags vary, but on the average are approximately as follows: For cabbages—Johannesburg, 150 lb.; Cape Town, 105 lb., and Durban, 90 lb. For cauliflower—Johannesburg, 100 lb.; Cape Town, 65 lb. and Durban, 85 lb.

Average Prices of Onions and Sweet Potatoes on Municipal Markets.

SEASON (1 July to 30 June).	ONIONS (120 lb.).						Sweet Potatoes. (120 lb.).		
	Johannesburg.		Cape Town.	Pretoria.	Durban.		Johan- burg. Table.	Durban.	Cape Town.
	Trans- vaal.	Cape.	Cape.	Cape.	Local.	Cape.			
1938-39.....	s. d. 3 3	s. d. 8 10	s. d. 7 4	s. d. 7 10	s. d. 8 6	s. d. 9 6	s. d. 5 7	s. d. 4 8	s. d. 5 3
1939-40.....	6 3	9 10	7 3	9 11	9 8	10 5	5 7	5 9	5 0
1940-41.....	12 5	12 3	9 10	11 11	11 2	12 7	7 3	6 4	5 5
1941-42.....	10 5	13 11	10 4	13 10	13 0	14 3	9 10	7 1	8 4
1942-43.....	13 8	14 0	12 6	14 7	12 9	14 5	9 8	8 1	8 5
1943-44.....	16 2	18 9	15 1	17 4	19 1	19 2	12 0	10 9	10 7
1944-45.....	14 7	18 7	14 8	18 1	18 8	19 5	17 3	15 1	16 3
1945—									
January.....	12 9	13 1	9 11	14 8	12 3	13 5	18 2	7 8	14 7
February.....	13 5	13 10	9 9	10 4	12 2	14 0	16 0	8 1	10 8
March.....	13 10	15 2	11 4	14 9	18 0	17 0	12 6	9 6	12 5
April.....	17 8	17 5	14 6	16 9	12 6	17 8	9 11	7 5	9 1
May.....	16 4	17 11	12 0	18 0	19 11	20 10	10 4	7 1	11 4
June.....	20 3	17 11	14 4	18 4	15 4	18 1	9 4	8 2	9 4
July.....	16 7	18 7	15 5	16 8	17 7	20 5	10 4	8 8	12 4
August.....	18 7	18 4	15 7	18 3	16 9	19 4	11 3	8 9	12 1
September.....	16 1	17 7	16 1	19 11	19 3	20 5	15 0	12 11	14 2
October.....	10 8	14 5	12 11	14 8	10 4	15 10	19 0	15 6	17 0
November.....	12 3	9 3	13 0	—	14 3	13 10	19 11	19 1	21 3
December.....	14 8	15 3	15 6	17 10	16 11	15 7	17 1	14 6	17 7
1946—									
January.....	12 0	12 1	9 7	—	11 7	13 0	17 1	15 6	17 3
February.....	12 3	13 8	11 1	13 1	15 2	9 11	17 3	10 3	17 2
March.....	11 4	12 4	9 9	12 10	12 9	13 5	18 5	14 8	14 8
April.....	12 1	12 10	11 3	13 10	15 1	14 9	15 2	17 4	14 7

Average Prices of Lucerne, Teff, Kaffircorn and Dry Beans.

SEASON AND MONTH (b).	LUCERNE (per 100 lb.).			Teff Johan- nesburg (a) 100 lb.	KAFFIRCORN in bags (200 lb.).		DRY BEANS (200 lb.) bags.		
	Johannesburg (a).		Cape Town 1st grade.		F.o.r. producers' stations.		Johannesburg (a).		
	Cape.	Trans- vaal.			K1.	K2.	Speckled Sugar	Cow- peas	Kid- ney.
1938-39.....	s. d. 3 10	s. d. 3 1	s. d. 4 0	s. d. 2 7	s. d. 13 1	s. d. 12 9	s. d. 25 0	s. d. 16 9	s. d. 24 2
1939-40.....	3 0	2 5	3 4	2 6	8 8	9 4	21 11	13 11	21 2
1940-41.....	4 2	3 5	4 3	3 3	15 6	17 0	30 0	16 8	27 11
1941-42.....	5 7	5 2	5 8	4 7	18 10	19 6	32 10	19 8	28 3
1942-43.....	5 5	6 0	7 4	5 5	24 10	24 10	34 0	25 8	24 2
1943-44.....	5 4	5 6	7 3	4 5	21 0	21 7	49 6	29 11	32 1
1944-45.....	6 4	5 4	7 2	4 9	18 8	18 8	88 7	39 6	70 6
1945—									
January.....	7 3	5 7	7 3	4 1	23 1	23 1	118 8	45 11	98 2
February.....	7 0	6 9	7 6	—	22 0	22 0	122 3	45 3	95 3
March.....	7 2	5 10	7 3	5 5	22 0	22 0	107 9	42 11	89 3
April.....	6 10	—	7 8	5 2	22 0	22 0	109 11	53 4	104 8
May.....	6 9	5 7	7 6	5 5	20 6	20 6	111 1	61 7	97 1
June.....	7 6	6 9	7 9	5 8	20 6	20 6	102 2	67 11	95 2
July.....	7 6	—	7 9	5 9	20 6	20 6	105 8	67 1	80 10
August.....	7 6	—	7 9	5 9	20 6	20 6	93 7	66 3	80 7
September.....	7 4	—	7 9	5 9	20 6	20 6	87 0	67 2	74 8
October.....	7 5	7 6	7 0	5 9	20 6	20 6	91 2	70 8	68 3
November.....	7 6	6 9	7 3	6 6	20 6	20 6	106 3	68 7	79 1
December.....	7 6	—	7 3	—	20 6	20 6	104 3	61 7	69 6
1946—									
January.....	7 6	—	8 1	5 9	20 6	20 6	103 4	68 6	75 4
February.....	6 0	5 10	8 1	5 9	20 6	20 6	90 8	69 3	69 4
March.....	6 2	5 3	7 4	5 4	20 6	20 6	86 8	61 11	63 7
April.....	7 0	5 6	—	4 11	20 6	20 6	91 4	51 0	74 3

(a) Municipal Market.

(b) Seasonal year for kaffircorn,
1 June-31 May.

Dry Beans, 1 April-31 March;

Lucerne and teff, 1 July-30
June.

CONTENTS

◆ ◆ ◆

	PAGE
EDITORIAL:	
The Investigation of Stock Diseases in South Africa	431
New Chief of the Division of Economics and Markets	430
ANIMAL HUSBANDRY:	
Preparation of Skins for the Market (P. D. Rose)	433
The Dairy Industry (J. P. van der Walt)	447
Pregnancy Disease or Domsiekte in Ewes (R. Clark)	450
The Composition of Milk Offered for Sale in Pretoria (S. Bakalor and A. A. de Kock)	453
A Manger for Dairy Cows (E. H. Penzhorn)	467
Salt Poisoning in Stock (Dr. D. G. Steyn)	472
Infectious or Contagious Abortion in Cattle (G. B. Sutton) ..	474
HORTICULTURE:	
Certified Vegetable Seed	443
AGRICULTURAL ENGINEERING:	
I. A Level for the Farmer (E. A. Oosthuizen)	444
POULTRY:	
Overheating and Chilling of Chickens (J. D. W. A. Coles) ...	477
Visceral Gout of Fowls (J. D. W. A. Coles)	483
The B.W.D. Testing Scheme in the Union (A. S. Canham) ...	485
Diagnosis of Fowl Diseases (J. D. W. A. Coles)	487
GENERAL:	
Fire-Proofing of Thatch (A. J. Taylor)	449
Appropriate Use of Wood (M. H. Scott)	479
FARM HOME:	
Eggs in the Diet (Miss P. J. Hattingh)	489
CROPS AND MARKETS	493

[NOTE.—Articles from *Farming in South Africa* may be published provided acknowledgment of source is given.]

FORD'S FOR SEEDS—A. FORD & Co. (Pty.) Ltd.

AGRICULTURAL SEEDSMEN.

SEED CONTRACTORS TO THE UNION GOVERNMENT,

P.O. BOX 5701.

CATALOGUES FREE

JOHANNESBURG.

G.P.—S.1385—1946—7—7,200.

New Chief of the Division of Economics and Markets.

MR. S. J. J. de Swardt, B.A., M.Sc., has been appointed Chief of the Division of Economics and Markets in succession to Dr. J. F. W. Grosskopf who retired at the end of last year after a period of service of ten years during which he acted as adviser to the Government on matters relative to economics and markets and at the same time set the young division on its feet and trained many of the



economists who hold responsible positions in the Civil Service to-day. The Government has not lost Dr. Grosskopf's services, however, since he has been appointed as a member of the Marketing Council.

Mr. de Swardt was born on 9 September, 1902 on the farm Kommetjiesdam, in the Kroonstad district, where he received his first schooling. Later he went to the Paarl Boys' High School. In 1925 he obtained the B.A. degree at the University of the Witwatersrand, with distinction in economics, and subsequently proceeded to the University of Minnesota, U.S.A. on a Government bursary, to specialize in Agricultural Economics.

In 1927 he was appointed as an Economist in the Division of Economics and Markets where he concentrated mainly at first on research in connection with agricultural production, and later, on marketing matters. On being promoted to the post of Senior Economist in 1935, he was put in charge of all the statistical services and research work of the Division.

In 1936 Mr. de Swardt went to Europe to investigate the practical application of control measures in connection with the marketing of agricultural products, in England, Holland, Germany and Denmark. His report on this investigation had a marked influence on the Marketing Act of 1937.

With the institution in 1942 of control over importation and the distribution of imported goods, Mr. de Swardt was seconded to the Department of Commerce and Industries where he served as Controller of Agricultural Machinery and Requisites, a post which he continued to hold even when in 1943, the control of these articles was placed under the Director-General of Supplies. In this capacity he went on a special mission to the U.S.A., Canada and England in 1944, to

FARMING IN SOUTH ... AFRICA

VOL. 21

JULY 1946

No. 244

Editorial:

The Investigation of Stock Diseases in South Africa.

A GREAT deal of criticism has been expressed of late in regard to the investigations in connection with stock diseases in South Africa. Farmers tend to grow impatient when there is any delay in the investigation of diseases occurring on their farms. For this reason, it is felt that a few facts should be given to show that the present staff at Onderstepoort is doing its utmost to improve conditions as far as possible.

During recent years dangerous diseases have made their appearance in the Union and in spite of the depletion of staff, all possible measures were taken to control these diseases and where possible, to investigate their origin and spread. In this connection mention should be made of the extensive outbreak of foot-and-mouth disease along the Kruger Game Reserve on a scale unequalled during the past 40 years. Newcastle Disease made its appearance in the coastal areas of Natal, causing a high mortality among poultry. Immediate steps had to be taken to check the spread of this disease and to exterminate it in the Union. Economically these diseases are very important and it is not sufficient merely to check their spread as far as possible, but it is necessary to stamp them out completely so as to prevent transmission of the infection. In 1944 a new disease, viz. lumpy skin disease made its appearance in the Union, and to-day practically the whole of the Transvaal and the Orange Free State is infected. This condition, which has been known to occur in Northern Rhodesia, is new to the Union. Investigation showed immediately that this was an extraordinary disease. The nature of its spread indicated that it was probably transmitted by some insect. As far as could be ascertained, this disease is not included among the described human and animal diseases. Investigations will have to be carried out in a new direction in order to study the causes of the disease, its propagation in the animal and its nature and incidence in the animal under natural conditions. This will require extensive as well as intensive research and the establishment of facilities for keeping the different animals under insect-free conditions. These circumstances are the cause of the cessation of practically all study in connection with animal nutrition.

During the war a tremendous increase was evinced in the production of vaccines, etc., at Onderstepoort. The following outstanding cases are quoted to show the extent of the increase in demand for vaccines since that time.

	1939.	1945.
Black quarter vaccine	759,465 doses.	1,337,005 doses.
Anthrax vaccine	4,609,030 doses.	6,096,090 doses.
Gallsickness vaccine	73,368 doses.	245,141 doses*
Horesickness vaccine	62,304 doses.	311,157 doses.
Contagious abortion vaccine	8,674 doses.	34,347 doses.
Fowl-typhoid vaccine	222,144 doses.	549,000 doses.
Chicken-pox vaccine	504,900 doses.	379,500 doses.
Paratyphoid vaccine	98,926 doses.	247,358 doses.

* For 1944.

At the end of last year a commencement was also made with the distribution of a vaccine against "lamsiekte."

Since the beginning of the war the Onderstepoort Institute has lost about 20 per cent. of its trained personnel—scientists with years of experience. In addition, more than 30 per cent. of the experienced technicians who helped with the preparation of vaccines, etc., left the institute. It should be remembered that most diseased conditions are caused by living organisms existing in a complex nature with all its obscure problems. Think of the attention devoted to-day by thousands of scientists to the study of infantile paralysis, malaria, tuberculosis, cancer, etc., and the millions spent on the creation of the necessary facilities.

This is sufficient indication of the difficulties with which the Division of Veterinary Science has to contend in its research, but these difficulties have not deterred experts who have remained at the Institution from offering their best services to farmers, especially to those in country districts whose livelihood is threatened from time to time by stock diseases. The Government is endeavouring to improve the staff position and to create better facilities for the research which is so essential to the comprehension and solution of the intricate problems of stock diseases in the Union. We would ask of the farming community just a little patience during the difficult years ahead while the necessary organisation is being effected with a view to enabling Onderstepoort to render the services rightly expected from it.

New Chief of the Division of Economics and Markets:—

solve the problems in connection with obtaining agricultural machinery and accessories.

In October 1945, Mr. de Swardt returned to his former Division in which he has now succeeded Dr. Grosskopf as Chief.

In addition to being Chief of the Division of Economics and Markets, Mr. de Swardt is a member of the Maize Control Board, the Wheat Control Board, the S.A. Bureau of Standards, and of the executive council of the S.A. Institute of Standards, and is Chairman of the Egg Levy Board.

The Preparation of Skins for the Market.

P. D. Rose, Senior Lecturer in Sheep and Wool, Grootfontein College of Agriculture, Middelburg, Cape.

PART I: INTRODUCTION: SLAUGHTERING AND SALTING.

THE unhealthy state of our export trade in hides and skins during 1928 and 1929 and also the numerous complaints from the overseas trade in regard to quality and packing, led the Government of South Africa after an exhaustive enquiry to institute machinery in 1930 for the control of the export of these products.

Inspection of hides and skins, at the ports, has been in force ever since, and great improvement has been effected in the grading and packing for export. However, much remains to be done to remedy faults due to slovenly methods of preparation on farms and at abattoirs. A visit to any one of our large skin warehouses will convince even the most optimistic person that the position is nothing less than deplorable. Many thousands of skins, of all classes, arrive daily in a lamentable condition; they are dirty, cut, torn, badly flayed and cured, often infested with moth and dermestid beetles, damaged by rats and disgracefully packed.

It is difficult, if not impossible, to obtain absolutely accurate data with regard to the loss incurred due to negligent preparation of skins, but competent authorities estimate it to be approximately 30 per cent. Assuming this figure to be correct, the average annual loss, taking into consideration the value of exported skins only, is in the vicinity of £600,000. Actually, the total loss is considerably greater since a very large number of skins is being used by local tanneries at the present time.

The delivery of first grade skins is as essential as the presentation of a wool clip in the most attractive manner; in fact, more so, because badly classified wool can be resorted, whereas badly prepared skins, especially those of a non-woolled variety, have irretrievably lost much of their utility and value. Nevertheless, for some unaccountable reason, skins are treated as a more or less worthless by-product on most farms and abattoirs. It is the exception rather than the rule to find the necessary attention being given to skins which they warrant in the ordinary routine of business economy.

As a result of the war a very large number of skins is being absorbed by local industry and the tremendous wastage, due to faulty flaying and preparation, is becoming shockingly obvious. If these industrial concerns are to survive in competition with other countries in the post-war period, it is imperative that every effort should be made to supply them with the very best raw material.

The National Wool Growers' Association of South Africa has done much to improve the good name of South African wool. There is great scope for a similar co-operative endeavour in the skin business. It is with this object in view that the following recommendations are made:—

Care of Sheep Prior to Slaughter.

Every precaution should be taken to avoid exertion, fright or abuse of any kind just prior to slaughter, since the palatability,

cooking and keeping qualities of the meat are greatly affected thereby. Also, bruises caused by rough handling depreciate the value of the skin. Glycogen, the source of energy stored in the muscles, is converted by a chemical change into lactic acid either during life or after death. Exertion or excitement hastens the change into lactic acid, which is liberated into the blood stream and so lost if the animal is killed soon after. The conservation of the maximum amount of glycogen at the moment of death is of the utmost importance, because the development of lactic acid after death is directly dependent on the quantity of glycogen present at the time of death.

Lactic acid acts on the collagen content of the connective tissue of hanging meat. The inter-fibrillar collagen swells and softens, and is more easily converted into gelatine during cooking, rendering



FIG. 1.—A cheaply constructed but very efficient slaughtering place with receptacle for blood in position.

the meat loose in texture, more juicy and tender. The presence of lactic acid is also essential to the production of meat of good keeping quality. Putrefactive bacteria thrive in a neutral or alkaline medium (e.g. fatigued meat), and are inhibited by acid (e.g. rested flesh).

The animal intended for slaughter should therefore be kept in close confinement in a cool quiet place for 24 hours prior to slaughter. Allow plenty of water but no feed. This will ensure

THE PREPARATION OF SKINS FOR THE MARKET.

that the stomach and intestines are rid of most of their unwanted contents, thereby rendering the operation of slaughter more cleanly.

Time to Slaughter.

Slaughtering should always be done in the early morning while it is cool, or, if this is inconvenient, late in the afternoon. The more rapidly the meat can be cooled off immediately after slaughtering, the longer it will keep fresh.

Cleanliness Essential.

To ensure that the meat for the home is clean and to avoid, as far as possible, conditions leading to rapid putrefaction, supply a liberal quantity of soap and water and insist on the slaughterman thoroughly cleansing himself. Also supply clean overalls. A saturated solution of salt water is an excellent antiseptic, and if the slaughterman is made to rinse his hands in such a solution just prior to "fisting" of the skins and during the process, hygienic conditions are ensured.



FIG. 2.—Lines showing how skin should be opened up in order to get a nice square skin giving the maximum leather surface.

The Slaughtering Place.

A cheap and permanent slaughtering place can easily be made with a few bricks, sand and cement. A flat surface is necessary,

sloping slightly towards one end, where a small ridge is built so as to collect and run off the blood through a central channel into a bucket or other receptacle placed in a hole dug for the purpose. Failing this, a single sheet of galvanized iron raised off the ground on bricks or planted poles, 8 in. and 6 in. high, will do equally well (Fig. 1). Don't allow the blood to run to waste; it only results in an accumulation of filth, which attracts flies. Dried blood can be used to advantage as a fertilizer or as chicken feed.

Method of Slaughtering.

Most natives make excellent slaughtermen, though they are by nature careless and slovenly. Unless the proper tuition and supervision is given, they will invariably do inferior work, with the result that a "first grade" skin becomes "damaged" and is worth much less.

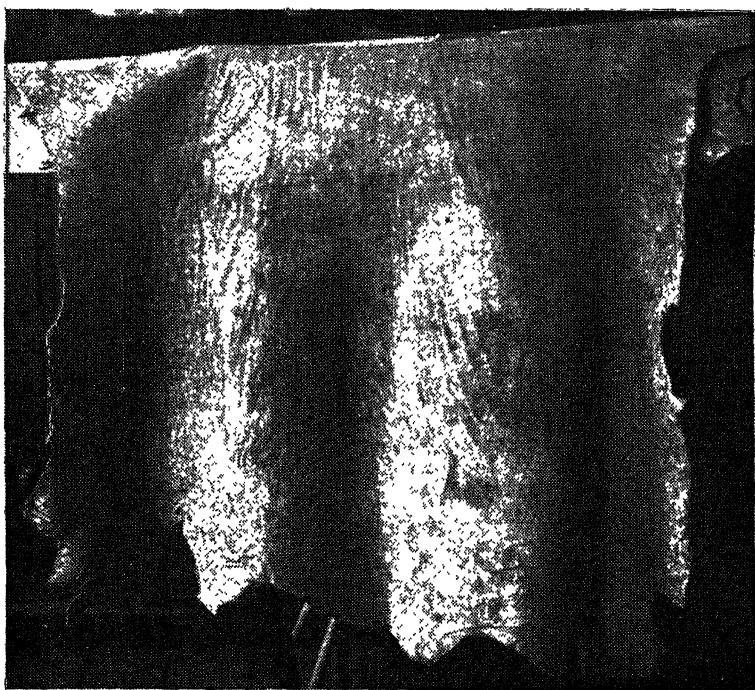


FIG. 3.—Tanned Blackhead Persian skin showing damage done by the use of the knife instead of the fist, rendering the skin absolutely valueless.

Opening up must be done along the correct lines in order to get a nice square skin, giving the maximum leather surface. Open up along the gullet in a straight line through the centre of the brisket and belly to the anus; from the inside of the knee joint down along the bare patch, nearest to the neck, to the point (front) of the brisket; from the inside of the hock joint along the lower side of the bare patch to a point just below the udder or scrotum (Fig. 2). The knife should be used only for opening up and around the points, the fist for the rest of the operation. Remove the skin immediately the blood from the jugular veins has ceased to flow; it comes off more

easily while the blood heat is still present. If blood gets on to the skin or wool, wash it off immediately. If the blood is allowed to dry, it stains the pelt permanently and renders the skin unsightly. Buyers do not favour bloodstained skins.

When the knife is used instead of the fist, small cuts invariably result. These are often not noticeable on the wet skin, but they show up very clearly when the skin has dried and open up entirely after tanning, rendering the skin useless for high class leather work (Fig 3).

Leathery Pelts Warrant Special Care.

The utmost care in the use of the knife should at all times be exercised, but more so when Persian, Cape bastard or Boer-goat skins are being handled. These skins belong to a class known as "Leathery Pelts" and their sole value lies in the pelt. The temptation to use the knife when slaughtering sheep of the fat-tailed breeds



FIG. 4.—The salt should be well rubbed in, especially along the edges, prior to rolling.

is very great, because it is not always possible to "fist" the skin from the fat. When the knife must be resorted to, cut into the fat rather than against the skin in an attempt to remove all the fat. The fat which adheres to the skin can easily be removed after the skin has been salted and rolled for 24 hours. (See under Cape and Blackhead Persian Skins.)

Care of the Skin.

The requisite conditions for the development of putrefactive organisms within the skin are present at the time of slaughtering, namely, moisture and heat. The bacteria responsible for putrefaction require these conditions for active development. Consequently, in order to preserve the skin, it is essential to remove the excess moisture, thereby reducing the heat and arresting bacterial activity.

There is only one entirely satisfactory method of curing skins and that is by strewing common salt over the surface of the wet skin. This method is recommended by all skin authorities as being not only the cheapest, but also the most effective.

Salt Penetration.

The penetration of salt into the skin is governed by the laws of diffusion and osmosis. The cells of the skin are porous and contain about 60 per cent. of moisture. Therefore, if salt is placed in contact with the skin, the moisture tends to draw the salt into the porous skin; and the salt, in conjunction with gradual evaporation, tends to draw the water out, thereby effecting an equal distribution of salt both inside and outside the skin.

Salt is only a mild antiseptic and does not destroy the bacteria (which are necessary in subsequent processes), but only arrests their development. In order to accomplish this successfully it is necessary that (1) the body heat be allowed to cool off before salt is applied; (2) the fibre of the skin be dehydrated; and (3) thorough salt penetration be obtained.

When to Salt.

Immediately the skin has been removed from the carcase it should be folded flesh to flesh and left in this position until the slaughterman has finished his work on the carcase. This will allow sufficient time (15 to 20 minutes) for the skin to cool off before salt is applied. Do not allow the skin to get wind-dried before salting because this inhibits thorough salt penetration. If this should occur, wet the skin slightly before salting.

Amount of Salt to Apply.

The correct amount of salt to use is 10 per cent. of the weight of the fresh skin. Fresh skins naturally differ in weight depending on the size of the animal and the growth of wool or hair. However, as the weight of wool or hair bears no relation whatsoever to the quantity of salt necessary for the skin, the quantities of salt for various sized skins given below will prove sufficiently accurate for all classes of skins.

<i>Size of Skin.</i>	<i>Amount of Salt to use.</i>
Small	12 ons.
Medium	18 ons.
Large	24 ons.

Secure three tins to hold just these amounts of salt and instruct the slaughterman accordingly. If the bottoms of the tins are suitably perforated the salt can be more evenly applied and there will be less wastage. If the fresh skin has not been properly folded the points or edges, being the first to be removed, often become partially wind-dried. If this does occur, wet slightly with a saturated cloth before salting. Open the points and salt well, then salt evenly over the rest of the skin. Rub the salt in well, especially on the points and sides (Fig. 4).

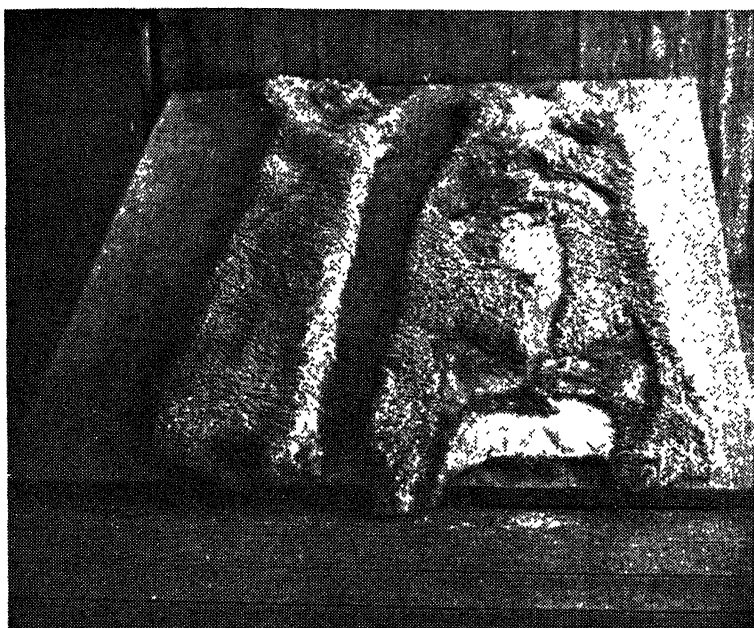


FIG. 5.—After the required amount of salt has been rubbed in, the sides are folded in to the centre of the skin before folding again prior to rolling.

When this operation is completed, fold in the points and sides flesh to flesh to meet in the middle. Then fold the skin down the centre of the back, and finally roll it into ball form. (Figure 5 and 6). Leave for at least 24 hours and then spread for drying.

Good Quality Salt.

Good quality salt is essential for skin curing. It is a common practice on most farms to use stock salt for skin curing, so that a word of warning concerning the quality of salt for animal consumption will not be out of place. Salt containing a large proportion of sodium sulphate (Na_2SO_4), while not harmful to skins, is detrimental to the health of stock and should therefore be avoided. Impurities found in poor quality salt, which should be avoided for skin curing, are alum, lime, iron and copper compounds. Lime produces lime blast and alum has a partial tanning effect which sets the hair and renders de-wooling more difficult. Iron and copper compounds produce stains in tannage.

A good salt has a clear transparent crystalline appearance, but to make quite sure of the quality, demand an analysis from the seller before purchase.

Use medium or fine grained salt. It is more economical, since better distribution and penetration is obtained.



FIG. 6.—*Skin in roll form*: After salting, the skin should be rolled and left for 24 hours in order to effect thorough salt penetration.



FIG. 7.—Removing superfluous fat from a Persian skin after being rolled in salt for 24 hours. The skin is then resalted, rolled and left for a further period of 24 hours before being opened up to dry.

Cape and Blackhead Persian Skins.

As previously explained, this class of skin often has a thick layer of fat attached, which inhibits salt penetration and generally renders the skins messy and unsightly. Do not attempt to cut this fat away from the skin but salt and roll in the usual way as recommended.

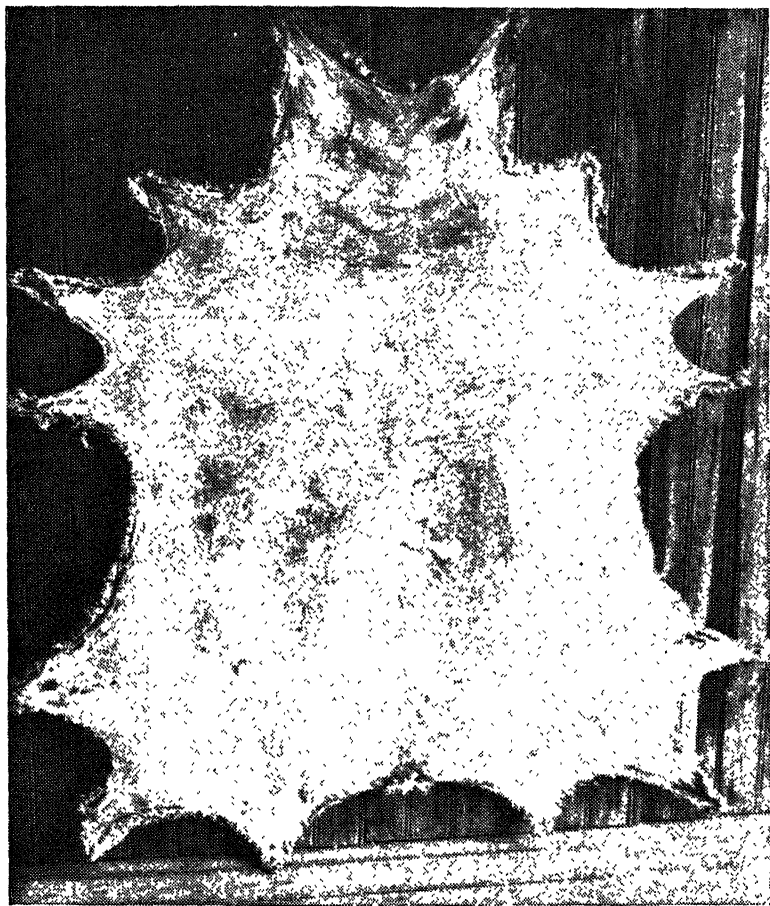


FIG. 8.—Pegged skin, showing damage done by uneven contraction in the drying process.

Leave for 24 hours and then scrape off the fat with a home-made scudding instrument (Fig. 7). At this stage the fat comes away very easily with little or no damage to the skin tissues. Salt again with the recommended amount of salt, roll and leave for a further period of 24 hours before opening up to dry.

Dead Skins.

The skin removed from the carcass of an animal that has died is known as a dead skin. Owing to the fact that the animal was not bled, the skin is blood-bound and is easily recognizable by its dark colour. As far as its leather value is concerned, such a skin is practically useless as it lacks tensile strength and is permanently discoloured.

In the case of woolled skins, which are sold at per pound, the value is determined by the length and quality of the wool on the skin. They are classified and sold on this basis irrespective of whether they are sound, damaged or dead skins. This position is most unsatisfactory and is one which must be remedied in the interests of the country and all concerned.

The same unsatisfactory state of affairs fortunately does not apply, as a general rule, in the case of "shearlings" or short-shorn Merino and crossbred skins. Sound skins of this type fetch better prices than damaged skins, being used in the manufacture of lumber jackets and flying suits, where a sound, well-cured skin is essential. Dead shearlings, therefore, fall into the same price category as dead Persian and Capes, i.e., the price is materially affected because the pelt itself is of little value. No treatment will change a dead skin into a good commercial article. Nevertheless, the old maxim, "If you look after the pence the pounds will look after themselves" still applies. They can be used to advantage as a protective covering on the outside of each bundle.

If putrefaction has set in wholly, or in part, the wool should be pulled or clipped off and the skin destroyed. If the skin has been allowed to dry before salt could be applied, it should be wetted before salt is applied. Roll and dry in the usual way.

Pegged Skins.

Skins should never be pegged but allowed to contract normally during the drying process. Pegging causes uneven contraction resulting in a thin papery pelt of uneven thickness (Fig. 8).

(N.B. A subsequent article will deal with the drying, storing and packing of skins.)

A Genetic Study of Sorghum Relationships.

THIS science bulletin, No. 242, by F. X. Laubscher of the Potchefstroom College of Agriculture, is a study of the inheritance of various sorghum characters which give an indication of the degree of relationship between the respective parents. The data obtained in this manner are interpreted in the light of current opinions on the botanical relationship between different groups of this genus. The bulletin is obtainable from the above-mentioned Institution at 3d. per copy.

Certified Vegetable Seed.

As a result of the unfavourable growing conditions during the past season, the importance of our agricultural production has been forcibly brought to the attention of every inhabitant of South Africa.

It will be readily understood that a desire prevails to safeguard whatever food supplies that have not been affected. It is erroneous, however, to assume that it is necessary to import vegetable seeds at this stage. The Division of Horticulture already has, where necessary, approved the importation of vegetable seeds in such quantities that these, together with those quantities obtained from local production, will meet all requirements. The supply position in respect of vegetable seeds was guaranteed by arranging for a twenty per cent. increase over that of the 1945 requirements.

Except for a few, the most important kinds of vegetables are safeguarded by seed grown in South Africa and certified by the inspection service of the Division of Horticulture. The term "Government Certified", when applied to seed, indicates that the growing seed crop was inspected on the land at regular intervals, was of pure strain, and that the germination percentage and purity of the seed have been tested.

Thus the Government certificate is a guarantee of quality, whereas no such assurance is usually supplied with imported seeds. This is of particular importance to farmers who may have handled seed which gave unsatisfactory results.

The Division of Horticulture can assure farmers and vegetable growers that South African seeds are good, and will produce a quality crop, provided Government certified seed is used.

Cabbage seed, with the exception of Cape Spitz cabbage, has not yet been produced in commercial quantities in this country, and it should be stated that all other cabbage seed has been imported. It is necessary, therefore, to point out that the numerous criticisms voiced in respect of unsatisfactory cabbage crops throughout the Union, and more particularly in the Eastern Transvaal, apply to imported seed.

It is still possible that local seed is obtainable which carries no Government certificate, and since this seed is not approved by the inspection service of the Division of Horticulture, it may be sold as South African, but it is not certified seed and therefore should not be used.

It is not correct to assume that imported seeds are invariably good or best.

The South African seed growers who are producers of vegetable seed, are farmers who are devoting their time and energy to the production of a commodity for the use of other farmers. At the time that the country was largely dependent on supplies produced by them, undue advantage was not taken to raise the price of seeds, since the policy of the growers is to dispose of their product at average world market prices.

The seed producers take a pride in their efforts, and have every reason to be proud of the progress made. The efforts of the growers have naturally not always been crowned with success, and frequently this was due to circumstances beyond their control. For example, in 1945 an ambitious programme for pea seed production was instituted, but owing to the fact that several growers were dependent upon

[Continued on page 449.]

Agricultural Engineering.

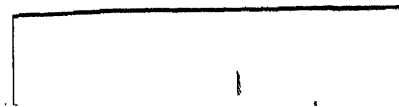


Fig. 1

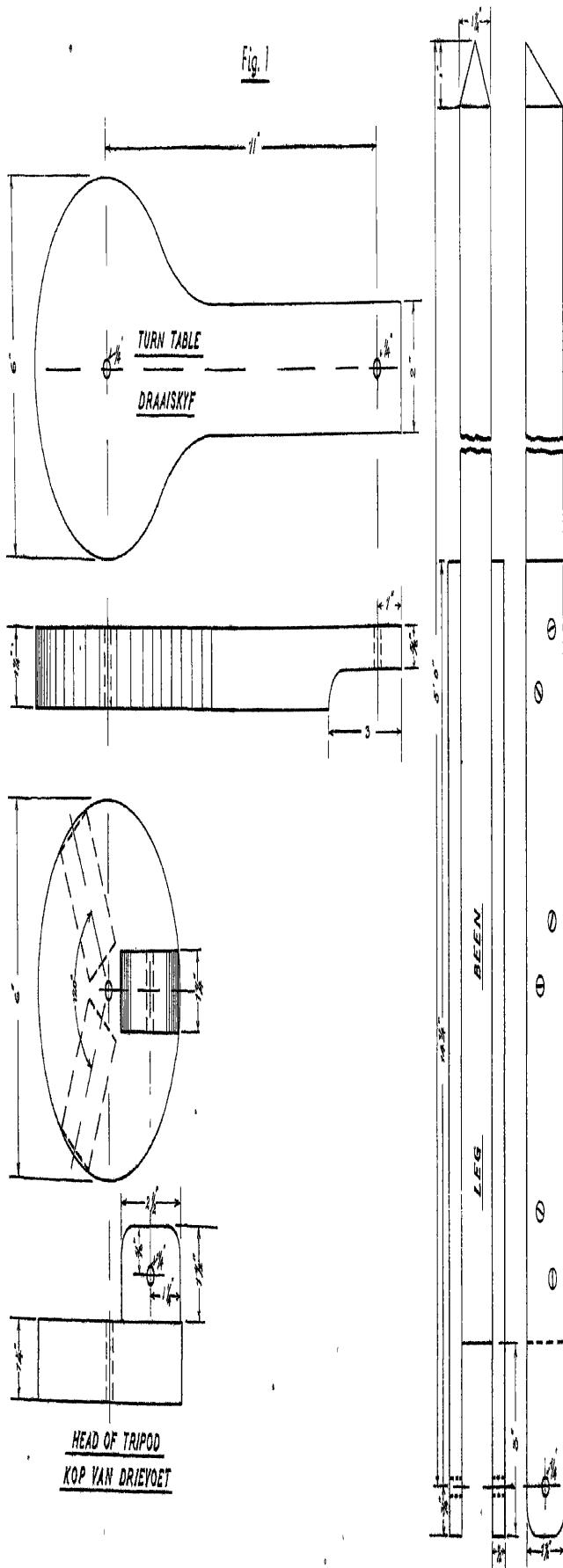
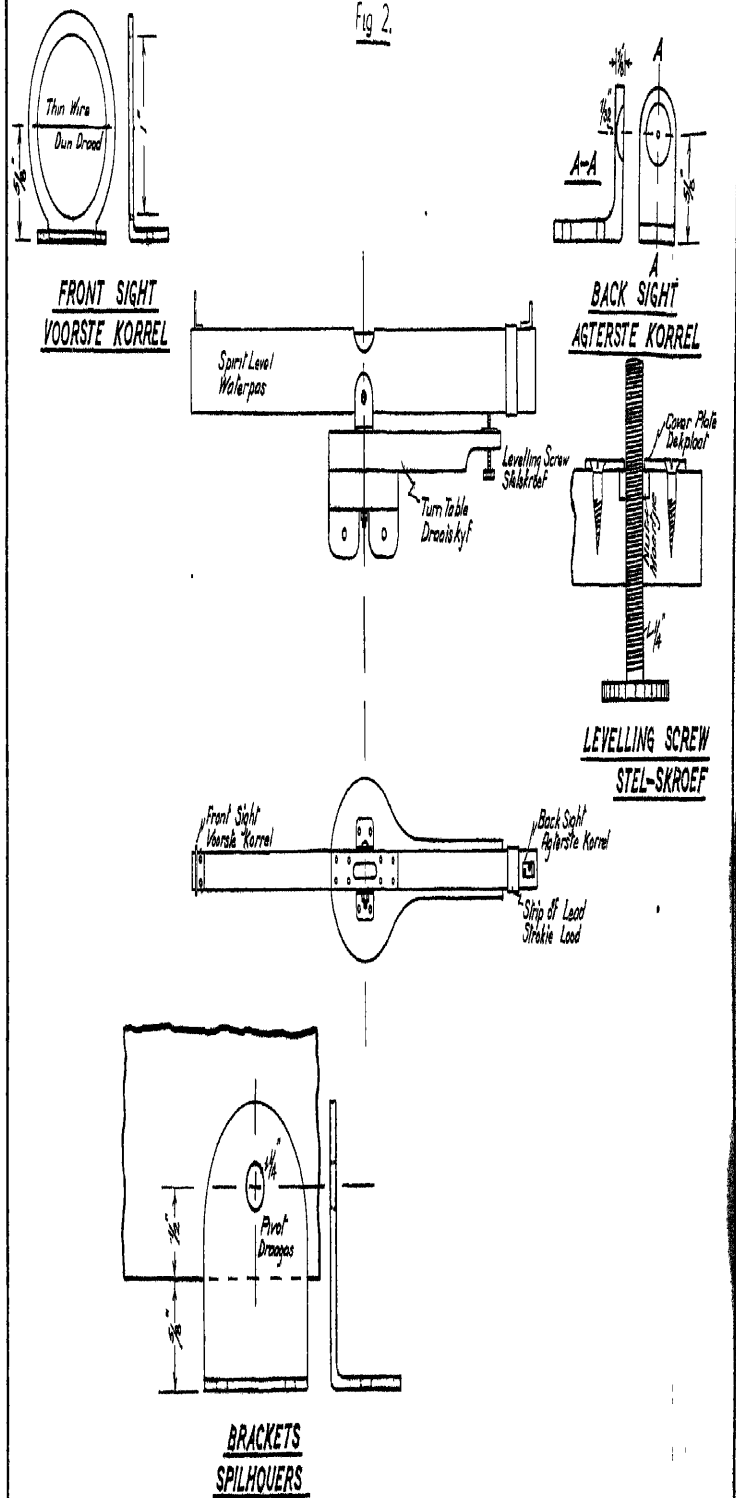


Fig. 2



Agricultural Engineering.

I. A Level for the Farmer.

E. A. Oosthuizen, Lecturer in Engineering, College of Agriculture, Potchefstroom.

LEVELLING instruments are expensive, and usually the layman does not see his way clear to buy such instruments although it is really necessary that he should have a means of taking levels for the purpose of contour ploughing, setting out dams and furrows and soil erosion works. A simple apparatus that will serve the purpose can easily be constructed by any one who has a few woodworking tools at his disposal.

The diagrams shown in Figures 1 and 2 are self explanatory and the only conditions are that fairly hard wood be used and that a reasonable amount of care be taken.

The spirit level used should be of excellent quality, not shorter than 30 inches and costing at least 20s. The level should be tested by first examining the amount of curvature of the phial and the type of fluid within. A cheap level usually has a phial with pronounced curvature containing a somewhat viscous fluid, so that the movement of the bubble is sluggish.

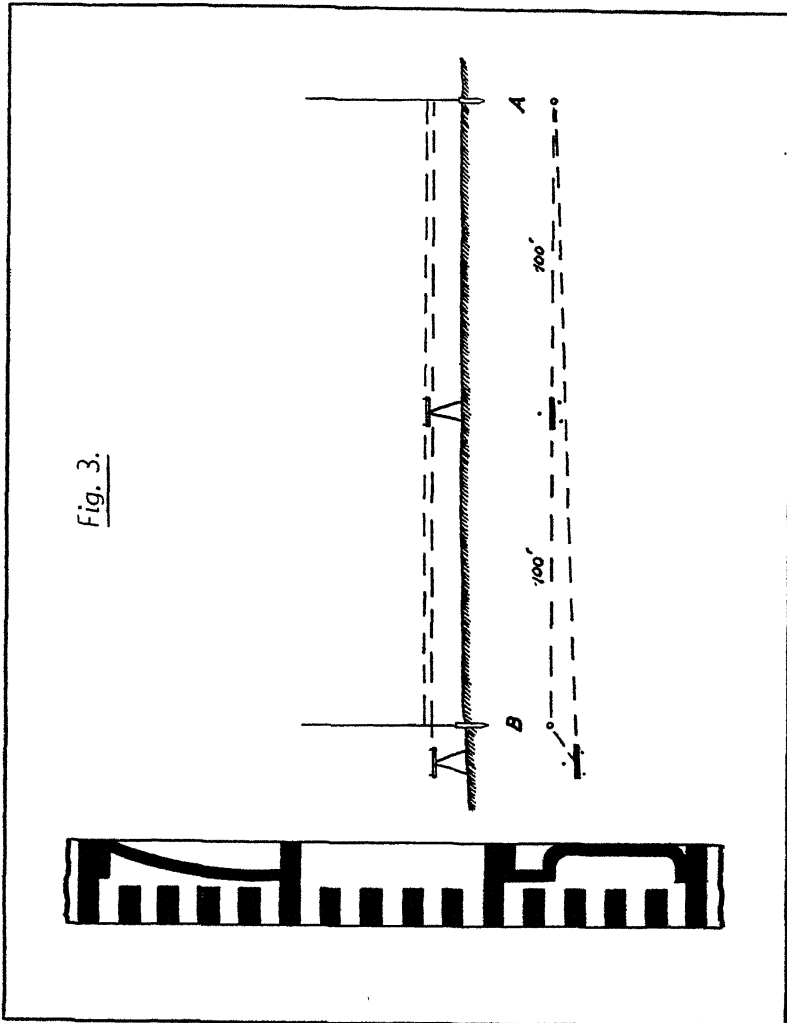
The better the level is, the less the curvature of the phial and the thinner the fluid, ether being used in levels of high class.

Next place the level on a firm, smooth surface such as a concrete floor and mark its exact position with a pencil. Bring the bubble to the centre of its run by carefully placing a thin wedge under one end. Now pick up the level, turn it end for end and carefully replace it in the exact position without displacing the wedge. If the spirit level is in reasonably good adjustment, the bubble will again come to rest in the centre of its run. If it does not, then the level should be regarded as unsuitable.

The brackets to which the level is pivoted (Fig. 2), can either be made of wood, or preferably of metal, screwed to the turn-table. Care should be taken to see that the hole for the pivot bolt is drilled accurately through the wood of the level. The exact centre of the bubble run and the height at which the hole has to be drilled should be found and marked on both sides, and the hole should be drilled half way through from one side and then completed from the other.

The back sight is a $\frac{1}{32}$ -inch peep-hole drilled as indicated in Fig. 2, while the front sight consists of a plate through which a 1-inch hole has been drilled and across which a thin wire is soldered in a truly horizontal position.

To set up the instrument it is merely necessary to place the legs of the tripod fairly wide apart on the ground and then turn the level so that it points parallel to two of the legs, and bring the bubble as nearly as possible to the centre of its run with either one or both of these legs. Then turn the level at right angles to its former direction so that it now points in the direction of the third leg and again bring the bubble as nearly as possible to the centre with this leg alone. Repeat once or twice until the instrument stands more or less level. Then, before taking a sight in any direction, make the final adjustment with the levelling screw to bring the bubble exactly to the centre of its run. Do not move the legs after the first rough adjustment has been made.



Since the level is pivoted exactly over the centre of the bubble, any adjustment with the levelling screw will not alter the height of the instrument in any way. It will be necessary to bend a strip of sheet lead round the wood of the level, as indicated, to hold it down on the levelling screw.

It is important that the levelling screw should always be returned to the position in which the level lies parallel to the turn-table after each set-up of the instrument before it is transferred to the next station. A permanent mark should therefore be made in the thread of the screw so that this adjustment can be made quickly.

The staff upon which the readings are taken may consist of a 4-inch strip of flooring, 10 to 12 feet long, with the feet and tenths of a foot or inches painted in dull black on a flat white background (Fig. 3). The tenths of a foot can be read with certainty at a distance of 100 feet, and it is convenient when working to the same level from one station, as in the case of setting out points on contour, to have a black rubber band (a strip of motor tube) one half inch

wide drawn over the staff. This band can be clearly seen at a distance of 300 to 400 feet on a white surface. The back of the staff should therefore also be painted white and used for this purpose.

To test the accuracy of the instrument, select a fairly level stretch of ground and drive in a peg A (Fig. 3) to within an inch of the surface of the ground on the up-grade. Measure a distance of 100 feet and set up the instrument at this point. Measure

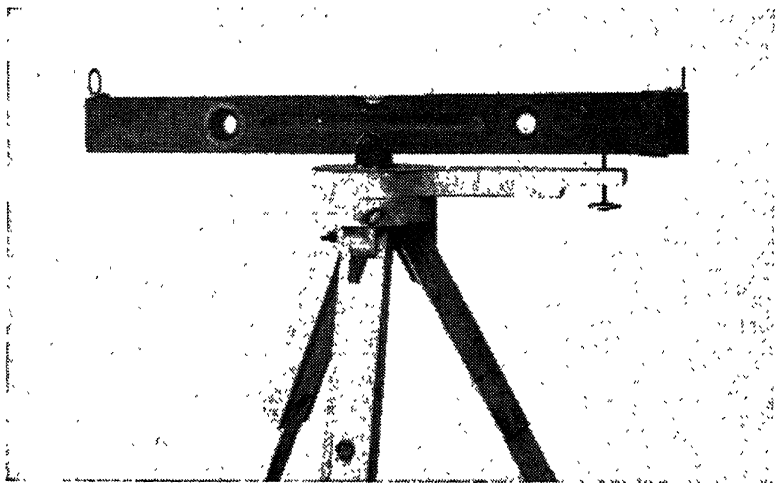


FIG. 4.—The level mounted on its tripod.

another 100 feet from the instrument in the same straight line and drive in a peg B at the end of the 200-foot line. Let the staff be held up straight on peg A, and after having carefully levelled up the instrument, have the rubber band moved until the line of sight cuts the band. Now let the staff be held on peg B and have the peg driven in until the line of sight cuts the band. The tops of the two pegs will now be on the same level. The instrument is then set up close to peg B, as indicated, and, after carefully levelling up, take a reading on the staff held on peg B and have the rubber band moved until it is cut by the line of sight. Now transfer the staff to peg A, and, if the instrument is true, the band will again be cut by the line of sight. If this is not the case, unscrew the sight, which is too low, and place a strip of paper or thin sheet lead under it and replace the sight. Again take readings on the two pegs B and A. Repeat until the readings are exactly the same. The instrument is then ready for use. The cup of the peep-hole should be blackened with a burning match so as to prevent reflection.

(N.B. This article is the first of a series.)

The Dairy Industry.

J. P. van der Watt, Lecturer in Dairying, College of Agriculture, Potchefstroom.

WHAT future has the dairy industry in South Africa? It is virtually impossible for anyone to furnish a correct and exact answer to this question to-day. An exchange of ideas on this subject would, however be very profitable, especially in view of the large numbers of returned soldiers who are inexperienced and uninformed in regard to the difficulties with which the dairy farmer and the industry have to contend, but have nevertheless decided to go in for dairy farming.

It is absolutely essential that the progressive dairyman should command a sound knowledge of animal husbandry, animal nutrition, economic production and the control and treatment of diseases, but it is equally important that he should be well-informed on the dairy industry as such. The dairy farmer supplies the unprocessed material in the form of milk or cream to the dairy factory where it is converted into commercial products. He is, therefore, completely dependent on the industry for the disposal of his products and the factory is, in turn, entirely dependent on him for the supply of raw material. Hence, both the dairyman and the factory have a definite and extremely important function to perform and the closest co-operation between farmers and factory is essential to ensure the future of the dairy industry.

It does not matter whether the factory is a co-operative undertaking in which the farmer shares a measure of control as well as part of the profits, or whether it is a private enterprise. The fact remains that the factory performs an important function by virtue of which it is entitled to the support and co-operation of the farmer. The co-operation between the farmer and the factory should, however, be fostered on both sides and this can be realized only on a basis of mutual trust and whole-hearted support and goodwill. In this connection it is essential that the factories should frequently come into close contact with the farmers. Visits to farmers by the manager or other persons specially trained for this purpose, can contribute much towards establishing a better relationship. The farmer can, however, also contribute much towards the success of the undertaking by displaying more interest in its activities by becoming acquainted with the factory personnel or by reading widely on subjects directly related to his business. The time has come for distrust to give way to co-operation. Every farmer should give his local factory his whole-hearted support and not continually switch from one factory to the next. This practice will never produce stability in the industry.

It is also in the interests of the factory to treat its suppliers well.

Requirements for Success.

The future of the dairy industry depends mainly on three important factors, viz. consumption, quality and the prices of dairy products.

No progress can be expected without a steady or increasing consumption of dairy products. The stability and expansion of the industry, especially where such perishable products as dairy products are concerned, are to a large extent contingent on the home consumption and demand. Increased consumption is, therefore, the basis for further development of the industry.

Although there has been a considerable increase in consumption and therefore in the demand for dairy products during the war years, dairy farmers cannot unquestioningly assume that this satisfactory state of affairs will continue. Schemes must be devised for ensuring that the progress which has already been made will be maintained and for providing *now* for further development.

All concerned in the dairy industry should unite in a publicity campaign for their products by advertising and in every possible way making propaganda for increased consumption of dairy products. Advertising can be effective only as long as a product of good quality is supplied. Consequently, careful attention should be paid to the composition and nutritional value of the products offered and to the production of reliable products, i.e. products which are free from disease germs and conform to the requirements for cleanliness, good flavour and palatability. It is in this respect that the dairyman and the dairy farm have a special function to fulfil. The dairy farm should always be so clean that it can serve as an advertisement for the industry. The public should be encouraged to visit dairy farms in order to see what measures are taken for supplying it with healthy, pure products of good flavour. Production will always be one of the most important aspects of dairying and the farmer should be able to furnish visitors with full particulars regarding the production, nutritional value and methods of consumption of dairy products. No well-informed person could deny the importance and nutritional value of dairy products in the diet. There are so many different types of dairy products and so many ways in which they can be prepared and served that they need never make the diet monotonous. In this connection we think of the more than 200 types of cheese, for instance hand-pressed cheese, soft cheese and cream cheese. The information supplied to the public by the home economics officers of the Department concerning the various ways in which dairy products can be used, is very highly appreciated and is undoubtedly a great service to the nation.

If dairy farmers wish the public to buy and consume their products in sufficient quantities, it is only right that these products should be marketed at prices which the public can afford and also that they should be of the quality the public demands.

The public cannot be expected to pay exorbitant prices for high-priced products, the high prices of which are solely due to inefficient and uneconomical methods of production. Stricter economy should be applied in the production of milk and cream. In no circumstances should dairy farms and dairy cows be bought at excessive prices. Only cows which yield plenty of milk should be used, and feeding should always be as economical as possible. In other words, the dairy farm should be managed on sound business principles.

Manufacturing and distribution costs can be reduced by better management, larger turnovers per unit and more effective distribution.

The producer must be prepared to sell his product at a reasonable profit, while the consumer should be prepared to pay a reasonable price for the value received.

Another factor which has had a very restrictive influence on the consumption of dairy products in the past, is the possibility of disease being spread by these products. Although many statements and allegations in this connection are grossly exaggerated, figures which sometimes come to one's notice are, nevertheless, alarming.

The Fire-Proofing of Thatch.

ONE of the drawbacks of thatch in farm buildings is the risk of fire. This danger can be largely eliminated, however, if the thatch is treated before use with a suitable protective material.

Ordinary alum is one of the best and cheapest of such chemicals, whilst ammonium phosphate, sometimes applied as a fertilizer, can also be used.

The bundles of thatch grass should be loosened and then well soaked in a solution of alum, about 4 to 8 ozs. per gallon of water. When thoroughly saturated, they should be removed from the solution and the surplus liquid allowed to drain back into the tank or vessel used for treating the thatch. Standing the loosened bundles on end on a sheet of corrugated iron leading into the tank will ensure good drainage and so save any surplus alum solution. The bundles should then be spread out to dry, by standing them on end against a wall or suitable rack so as to ensure a good circulation of air around and through them. It is important that the thatch be thoroughly dry before it is put on the roof. Damp thatching material employed in constructing a roof is very liable to become mouldy and to rot.

The thatch should be treated with the alum before it is used. It is less satisfactory to spray a thatch roof already built, since the grass does not become properly impregnated with alum, especially the inner layers to which the solution does not penetrate.

Thatch thus treated will be found to smoulder but not to burn freely. The alum, which coats the grass, fuses and so forms a protective glaze on the thatch which prevents the access of air to the material and so makes it difficult to ignite. Sparks falling on such treated thatch will not set it alight.

The use of alum has a further advantage in that it makes the thatch less liable to harbour insects.

(A. J. Taylor, Lecturer in Chemistry, College of Agriculture, Cedara.)

Certified Vegetable Seed:—

[Continued from page 443.]

imported pea seed, which proved later to be of impure strain, the resultant crops could not be certified for use as "Government Certified" seed. On the other hand, growers who used *South African* certified parent seed, almost invariably had their crops certified.

At the seed-testing plots of the Division of Horticulture at Pretoria, Stellenbosch, Oudtshoorn, Potchefstroom, Upington, Vaalhartz and Nelspruit it is possible to see the result obtained with our certified South African seed, in comparison with seed obtained from other sources. Growers are invited to visit and inspect these plots at any time, by arrangement.

The import control of vegetable seeds which was inaugurated during the war period, is still in operation. Notwithstanding this restriction, applications for permits to import seeds receive careful consideration according to available supplies, and each application is therefore treated on its merits. In this way it is possible to compare, under field conditions, the respective merits of imported as well as Government certified seed.

(Division of Horticulture, Pretoria.)

Pregnancy Disease or Domsiekte in Ewes.

R. Clark, Division of Veterinary Services, Onderstepoort.

THIS disease has long been known in South Africa, and is most common in the Karoo and in the western Cape Province. It occurs in practically all countries where sheep are kept. The disease is nearly always confined to heavily pregnant ewes, within about a month of lambing. Although domsiekte is not one of our most important sheep diseases, it can cause severe losses of both ewes and lambs. Valuable stud ewes are very often affected.

The first thing usually noticed about an affected ewe is that she lags behind the flock and often remains in the veld when the others have returned to the kraal. At first the sheep may be nervous, with twitching ears and a high-stepping gait. In this stage spasms may pass over the body at intervals, rather as if the animal has hiccoughs. Very soon, however, the animal shows the typical dullness and stupidity which have given rise to the most descriptive Afrikaans name, "domsiekte". The animal often becomes blind either in one eye or in both, and does not eat or move with the flock. A sheep suffering will often stand quite still while the rest of the flock is driven past it. Later the animal goes down and lies as if fast asleep in deep coma from which nothing can rouse it. This stage may last a day or more before death. Sometimes ewes abort in the earlier stages and then recover.

Condition of Liver.

At post-mortem it is usually noticed that the sheep is heavily pregnant and in good, fat condition. The only really striking change seen in the organs is that the liver is very pale, often being a yellow khaki colour and very soft. This change is due to a large amount of fat in the liver which can often be seen on the knife and felt with the fingers. The typical symptoms and fatty liver, occurring in ewes heavy in lamb, should enable every farmer to recognize the disease.

The cause of the disease has long been a mystery, but it has been shown at Onderstepoort that if fat, heavily pregnant ewes are suddenly put on to a poor diet of dry hay they contract domsiekte within a few days. Older ewes are more susceptible than young ones, and the better the condition of the ewe the quicker the disease appears. It can therefore be stated that the cause of the condition lies in the feeding or management. The idea that domsiekte was due to a mineral deficiency and could be cured or prevented by feeding bonemeal can now be discarded. Bonemeal and stock licks may, under certain conditions, aid digestion and increase appetite and therefore may help to ward off the disease, but can do no good in themselves unless an adequate food supply is also available.

There are very good scientific reasons to explain how a sudden reduction in diet can cause domsiekte, but these need not be gone into here.

The fact that the fatter the sheep, the more liable it is to get domsiekte explains why stud ewes are often affected.

Sudden Changes.

As it is unlikely that any farmer would feed his sheep well for the first four months of pregnancy and then suddenly starve them, we will try to explain how this may happen in practice.

The first case in which this may happen is, naturally, if the sheep are given a grain such as mealies and this is suddenly stopped at the critical time.

Another and more common cause would be a sudden change in the grazing which might occur owing to a sudden frost, or drought or failure of the water supply to irrigated lands. It is interesting to note that domsiekte often appears after a sudden change in the climate.

The same effect might be brought about without any change in the feed or grazing if the sheep suddenly stopped feeding. A few days of cold rain may easily put sheep off their feed, and, if they are fat and heavily pregnant at the time, they may get domsiekte in spite of the fact that plenty of food is available.

It must also be remembered that sheep, and especially pregnant ewes, are very sensitive to changes in their habits and environment. A change of camp at the critical time, although possibly for the better, may upset the sheep and cause them to eat little or nothing for a day or so. Sudden changes in the weather may have the same effect.

A peculiar fact about heavily pregnant sheep must here be stressed. It has been noted at Onderstepoort that if these ewes are deprived of their food for even one or two days, they refuse to eat when food is again offered. This is not the case with other classes of sheep. The explanation may be that a fat, heavily pregnant sheep begins to feel ill from domsiekte long before anything can be seen, and so it does not feed. This means that, in practice, it is not necessary for the sheep to be off their feed for long to cause the disease.

It must also be remembered that any other illness will put sheep off their feed, especially trouble in the stomachs or bowels. Constipation or diarrhoea, whatever the cause, will not only cause sheep to stop eating, but will also prevent the absorption of the foodstuffs into the body, and this will have the same effect.

Certain poisonous plants, such as "sprinkaanbos", cause severe constipation and loss of appetite, and so may indirectly cause domsiekte.

Prevention and Treatment.

The prevention of domsiekte is a matter of flock and grazing management. The main point is to see that the ewes maintain their weight during the last stages of pregnancy. Although pregnant ewes should, of course, be well fed, it is better not to have them in an over-fat condition, as this makes them more likely to suffer from the disease. The feeding and grazing of pregnant ewes should be well planned beforehand so as to avoid, as far as possible, the necessity for making changes near lambing time. Should the weather change suddenly just before lambing, the sheep should be carefully watched for cases.

There is unfortunately no sure cure for the disease, but in treatment we must try to give the food which is lacking, and get the bowels working. Constipation is almost always present in these cases. The food most required and most easily absorbed by the body is sugar. The following dose can, therefore, be given:—

Raw linseed oil, about 4 oz.; or Epsom salts, 3 or 4 oz.

Sugar $\frac{1}{2}$ lb. dissolved in water or given dry, and a tablespoonful of vinegar.

Dosing with Tube.

It must also be remembered that the animal usually refuses to drink and so must be dosed with water. When the animal is in the coma stage, it cannot be dosed as the fluid will run down into the lungs and cause pneumonia. The only safe way to dose in this case is to use a tube. A fairly stiff piece of rubber tubing, about $\frac{1}{2}$ inch in diameter and 2 feet long, is required. Smear the tube with oil or vaseline and open the sheep's mouth as for ordinary dosing. Poke the end of the tube along the top of the tongue to the throat and let the sheep swallow, then gently push in another eight or ten inches of the tube. Feel just behind the windpipe about the middle of the neck on the left-hand side; if you can feel the end of the tube moving down the neck when you push it, you can be sure the tube is in the gullet. Now fix a funnel to the end of the tube sticking out of the sheep's mouth and simply pour in your dose. This is a very safe and clean way of dosing and, with practice, can be done quite easily. The only danger is that the tube may go down the windpipe. This rarely happens, but if it does the sheep will cough and struggle violently. The air can also be heard as it is sucked in and blown out of the funnel with each breath. As the windpipe is a stiff-walled tube, you will not be able to feel the rubber tube inside it.

The main object in the treatment of domsiekte must be to try to get the bowels to work and to get the sheep to feed. In the meantime, to keep up the sheep's strength, sugar water must be given.

In conclusion, the Director of Veterinary Services would greatly appreciate it if farmers report outbreaks of domsiekte, giving the following details:—

- (1) The date of the outbreak and the date the ewes were expected to lamb.
- (2) The condition of the affected ewes (fat, medium or poor).
- (3) Any change made in the feeding or any change in the weather about a week before the outbreak.

Such practical observations will greatly assist in our understanding of the cause of the disease, and may be helpful in improving our advice on its prevention.

IMPORTANT NOTICE.

Will persons who place orders for vaccines please note that:—

- (a) No refund of the purchase price or credit will be made if purchasers return the vaccine to the Department.
- (b) Such returned vaccine will always be destroyed.

Ask for Price List of Laboratory Products and note the correct addresses.

The Composition of Milk Offered for Sale in Pretoria.

S. Bakalor and A. A. de Kock, Agricultural Research Institute, Pretoria.

A CONSIDERABLE amount of information is available on the composition of milk in countries such as Great Britain and the United States of America. In South Africa, however, comparatively little has, up to the present, been published on this subject. From complaints made by cheese factories about the chemical quality of their milk supplies, and according to the records of municipal health departments, however, it appears that the solids content of local milk is comparatively low.

To ascertain the extent of any deficiency in the composition of the country's milk supply and to find the causes of such deficiency, planned investigation is essential. The Agricultural Research Institute has thus, since 1943, been engaged on studies relating to the composition of milk. At the commencement of these investigations it was decided to obtain information on milk offered for sale to the consumer, Pretoria being selected as the first point of study.

I. Materials and Methods.

(a) Source of Samples.

Samples were taken weekly (except for an interval of one week in December and three weeks in March) from milk depots in the Pretoria city area (excluding Innesdale) between the dates 16th August 1943 and 29th May 1944 (38 weeks). For the first 30 weeks of the investigation, samples were taken from 34 out of the 36 registered milk-distributing depots in this area. During the last five weeks, five depots had to be eliminated from the investigation, because they were either absorbed by other firms and thus obtained their milk from one bulk supply, or because they were unable to give samples regularly owing to the severe seasonal shortage of milk.

Altogether 1,257 samples of milk were analyzed and it can safely be estimated that over 95 per cent. of the Pretoria milk supply was covered by this survey.

(b) Methods of Sampling and Analysis.

A well mixed sample was taken from the counter can or bulk supply (which was usually in cans) of the dairy. As most dairies do not have facilities for bulking all the milk received from their various suppliers, and thus bottle and sell out the milk of one supplier at a time, it was almost impossible to obtain a representative sample of all the milk on hand at any time. As the investigation aimed at determining the composition of milk as offered to the consumer, the above method of sampling was considered satisfactory.

The total solids and ash contents of the samples were determined gravimetrically. The percentage fat was obtained by the official Gerber method and the percentage protein by the Kjeldahl method. The S.N.F. (solids-not-fat) content was calculated by subtracting the percentage fat from the percentage total solids, and the lactose content by subtracting the sum of the fat, ash and protein percentages from the total solids percentage.

(In the first week of the investigation the ash, protein and lactose contents of the milks were not determined.)

II. Results.

The highest and lowest percentages of the various constituents found in the samples are given in Table I.

TABLE I.—*Highest and Lowest Percentages of the various Constituents found in any of the Samples.*

Constituent.	Highest Percentage.	Lowest Percentage.
Total Solids.....	15.10	8.54
Fat.....	7.2	1.8
S.N.F.....	10.50	6.64
Ash.....	0.652	0.354
Protein.....	3.74	2.33
Lactose.....	6.01	3.71

In order to show the distribution of the results for the various constituents between the particular limits given above, the percentage distributions for these constituents, indicate the percentage of

TABLE II.—*Percentage Distributions for the various Constituents of Milk.*

(a) TOTAL SOLIDS.		(b) FAT.	
Class Range (Interval = 0.25 per cent.).	Percentage of Total No. of Samples.	Class Range (Interval=0.25 per cent.).	Percentage of Total No. of Samples.
8.50-8.74.....	0.08	1.75-1.99.....	0.40
8.75-8.99.....	0.0	2.00-2.24.....	0.08
9.00-9.24.....	0.0	2.25-2.49.....	0.56
9.25-9.49.....	0.0	2.50-2.74.....	2.07
9.50-9.74.....	0.0	2.75-2.99.....	8.67
9.75-9.99.....	0.08	3.00-3.24.....	24.50
10.00-10.24.....	0.32	3.25-3.49.....	24.02
10.25-10.49.....	0.24	3.50-3.74.....	21.48
10.50-10.74.....	0.48	3.75-3.99.....	8.51
10.75-10.99.....	1.84	4.00-4.24.....	5.33
11.00-11.24.....	4.20	4.25-4.49.....	1.67
11.25-11.49.....	10.82	4.50-4.74.....	1.51
11.50-11.74.....	16.79	4.75-4.99.....	0.16
11.75-11.99.....	23.22	5.00-5.24.....	0.32
12.00-12.24.....	16.79	5.25-5.49.....	0.0
12.25-12.49.....	11.22	5.50-5.74.....	0.24
12.50-12.74.....	6.36	5.75-5.99.....	0.08
12.75-12.99.....	3.82	6.00-6.24.....	0.16
13.00-13.24.....	1.51	6.25-6.49.....	0.16
13.25-13.49.....	1.03	6.50-6.74.....	0.0
13.50-13.74.....	0.24	6.75-6.99.....	0.0
13.75-13.99.....	0.16	7.00-7.24.....	0.08
14.00-14.24.....	0.32	—	—
14.25-14.49.....	0.16	—	—
14.50-14.74.....	0.16	—	—
14.75-14.99.....	0.08	—	—
15.00-15.24.....	0.08	—	—
	100		100

COMPOSITION OF MILK OFFERED FOR SALE IN PRETORIA.

TABLE II (*Continued*).

(c) SOLIDS-NOT-FAT.		(d) ASH.	
Class Range (Interval = 0.25 per cent.).	Percentage of Total No. of Samples.	Class Range (Interval = 0.050 per cent.).	Percentage of Total No. of Samples.
6.50-6.74.....	0.08	0.350-0.399.....	0.08
6.75-6.99.....	0.0	0.400-0.449.....	0.0
7.00-7.24.....	0.24	0.450-0.499.....	2.38
7.25-7.49.....	0.16	0.500-0.549.....	6.21
7.50-7.74.....	0.72	0.550-0.599.....	12.67
7.75-7.99.....	2.31	0.600-0.649.....	20.93
8.00-8.24.....	8.18	0.650-0.699.....	24.04
8.25-8.49.....	32.94	0.700-0.749.....	25.35
8.50-8.74.....	30.63	0.750-0.799.....	6.38
8.75-8.99.....	19.56	0.800-0.849.....	1.14
9.00-9.24.....	4.30	0.850-0.899.....	0.73
9.25-9.49.....	0.64	0.900-0.949.....	0.0
9.50-9.74.....	0.08	0.950-0.999.....	0.08
9.75-9.99.....	0.08	—	—
10.00-10.24.....	0.0	—	—
10.25-10.49.....	0.0	—	—
10.50-10.74.....	0.08	—	—
	100.0		100.0

(e) PROTEIN.		(f) LACTOSE.	
Class Range (Interval = 0.10 per cent.).	Percentage of Total No. of Samples.	Class Range (Interval = 0.20 per cent.).	Percentage of Total No. of Samples.
2.30-2.39.....	0.08	3.70-3.89.....	0.41
2.40-2.49.....	0.08	3.90-4.09.....	0.73
2.50-2.59.....	0.08	4.10-4.29.....	2.12
2.60-2.69.....	0.24	4.30-4.49.....	8.20
2.70-2.79.....	1.72	4.50-4.69.....	22.31
2.80-2.89.....	6.55	4.70-4.89.....	33.68
2.90-2.99.....	18.33	4.90-5.09.....	22.06
3.00-3.09.....	27.31	5.10-5.29.....	7.87
3.10-3.19.....	23.35	5.30-5.49.....	2.13
3.20-3.29.....	12.92	5.50-5.69.....	0.25
3.30-3.39.....	5.09	5.70-5.89.....	0.08
3.40-3.49.....	2.54	5.90-6.09.....	0.16
3.50-3.59.....	0.74	—	—
3.60-3.69.....	0.41	—	—
3.70-3.79.....	0.16	—	—
	100		100

the total number of samples falling in groups or classes (each of the same size or class limits), are given in Table II. This information is further illustrated in Figure I.

The following is a summary of the results obtained from a further study of the data presented in Table II.

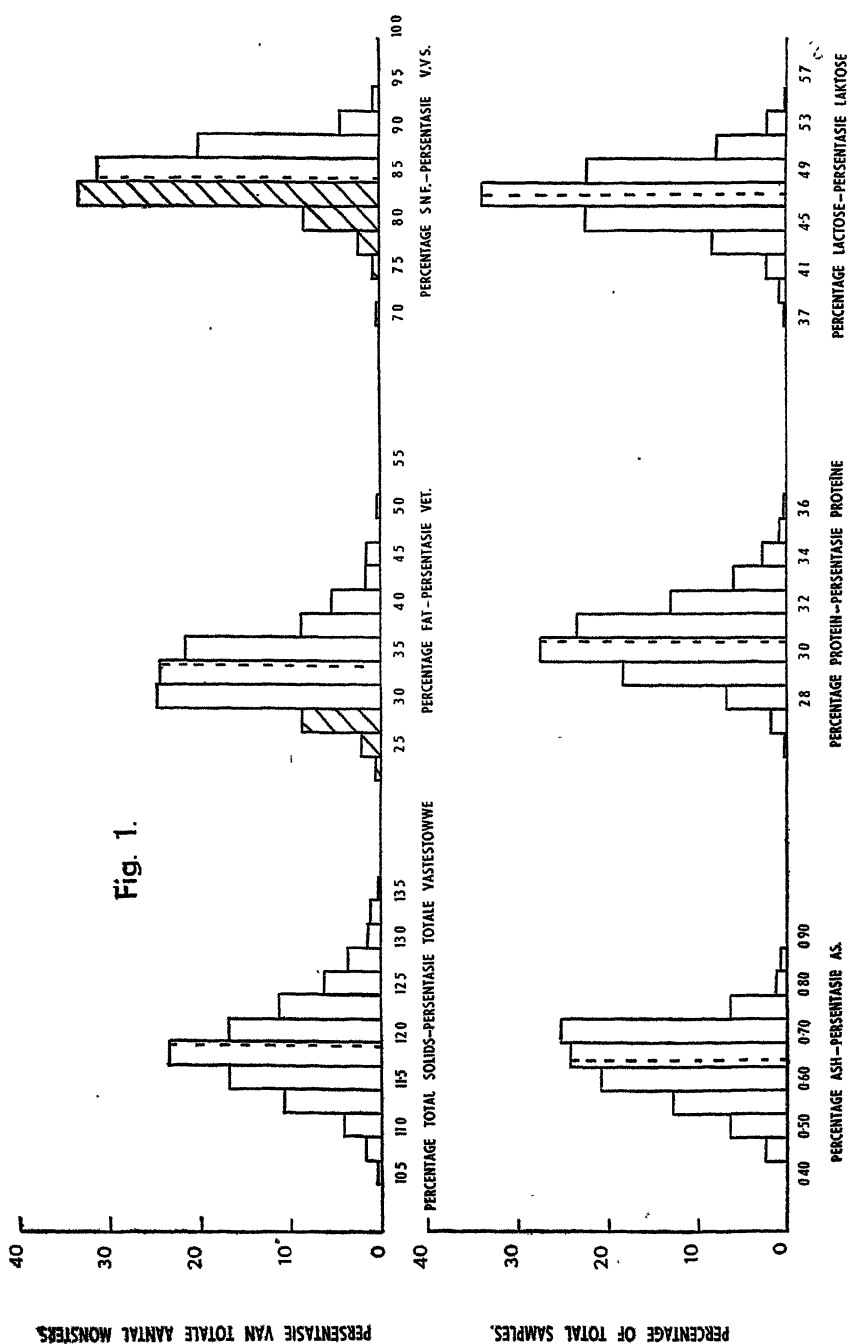


Fig. 1.—Percentage distribution of the different constituents of milk. The dotted lines indicate the means and the shaded areas the percentage samples below the respective standards.

PERSENTASIE VAN TOTAAL AANTAL MONSTERS.

PERCENTAGE OF TOTAL SAMPLES.

N.B.—In Fig. 1 the decimal point should be inserted before the last figure in all the figures below all the graphs except in the case of percentage ash where two figures appear after the decimal point.

THE COMPOSITION OF MILK OFFERED FOR SALE IN PRETORIA.

TABLE III.—*Summary of Results of the various Analyses.*

Constituent.	No. of Samples.	Mean (or Average).	Median.*	Coefficient of Variability.†
		%	%	%
Total solids.....	1257	11·96	11·91	4·835
Fat.....	1257	3·44	3·39	13·586
S.N.F.....	1257	8·53	8·54	4·879
Ash.....	1223	0·661	0·652	11·53
Protein.....	1223	3·10	3·08	5·145
Lactose.....	1223	4·79	4·79	5·408

* If the results of the analyses are arranged in order of magnitude, then the *median* is the value which divides the data exactly into two halves. Thus, for total solids, 50 per cent. of the samples tested lower than the median, i.e. 11·91 per cent.

† The *coefficient of variability* is a value which indicates the percentage distribution or spread of the data around the mean or average, i.e. whether a greater percentage of the values test near the mean or differ from it to any extent. This coefficient is thus of value in comparing the distributions of results for the various analyses made in this study.

The regulations framed under the Foods, Drugs and Disinfectants Act (No. 13 of 1929) lay down minimum standards of 3 per cent. for the fat content of milk and 8·5 per cent. for the S.N.F. content. No standards are laid down for the individual S.N.F. constituents, viz. the ash, protein and lactose. From the respective frequency distributions and coefficients of variability it will be seen that in the case of constituents subject to public health control, samples tend to test near the legal minimum. Of all the constituents, fat varied most. The S.N.F. showed much less variation; e.g. more than 40 per cent. of the samples tested between 8·00 per cent. and 8·50 per cent. S.N.F., and more than 80 per cent. between 8·25 per cent. and 8·99 per cent. S.N.F.

It will be seen that of all the individual S.N.F. constituents, ash varied the most. Protein varied within very narrow limits; e.g. about 70 per cent. of the samples tested between 2·90 per cent. and 3·20 per cent. protein.

As a basis of comparison of the averages found in this study, the following average figures for analyses made by British and American investigators on hundreds of thousands of samples of milk, and given by Davies in Chapter II of his standard work, "The Chemistry of Milk", are tabulated below. It must be borne in mind that many of the results from which these averages are derived, represent the milk of individual cows and not bulk milk.

	Total Solids.	Fat.	Ash.	Protein.	Lactose.	S.N.F.
Maximum.....	18·00	7·80	0·90	4·50	6·00	—
Minimum.....	10·00	2·30	0·60	2·0	3·50	—
AVERAGE...	12·69	3·67	0·73	3·42	4·78	8·89

Fig. 2.

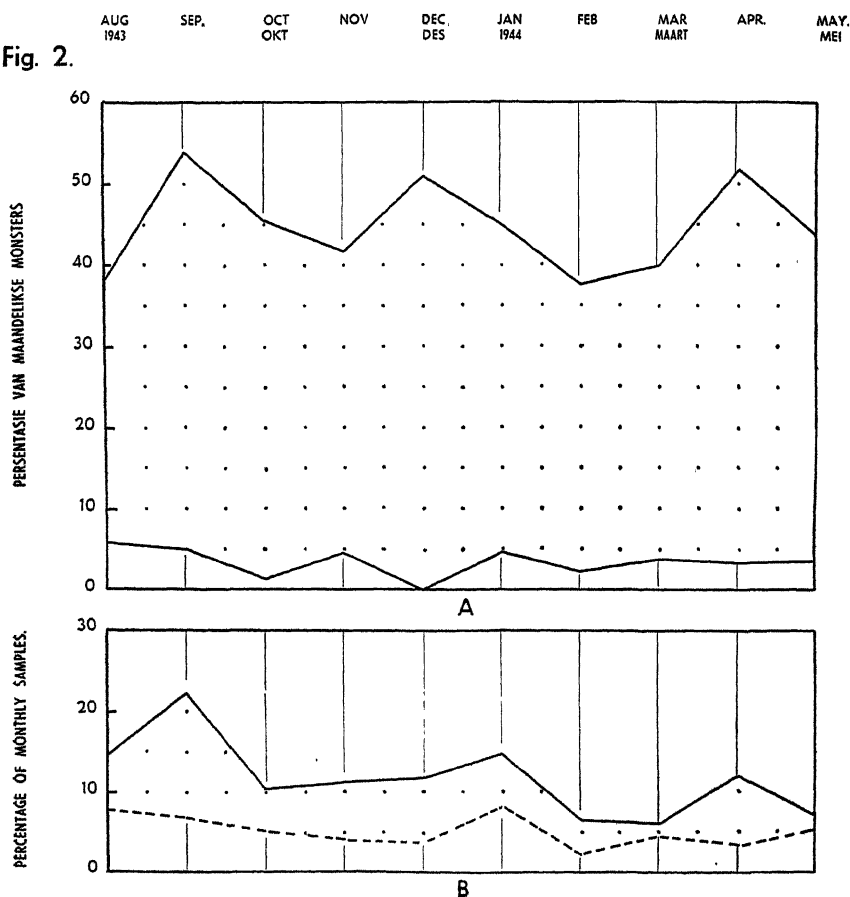


Fig. 2.—Percentage of samples per month deficient in composition.
 A. *Upper line.*—% of monthly total testing below 8.5% S.N.F.
Lower line.—% of monthly total testing below 8% S.N.F.
 B. *Upper line.*—% of monthly total testing below 3% fat.
Lower line.—% of monthly total testing below 3% fat and 8.5% S.N.F.
 (The dotted area in Graph A indicates the large percentage of monthly samples testing between 8.0% and 8.5% S.N.F. The dotted area in Graph B indicates the percentages of monthly samples deficient in fat only.)

It will be seen that, except in the case of lactose, the averages found in the present study are much lower than those obtained in overseas investigations. The average percentage of lactose for local milk was exactly 0.01 per cent. higher than the overseas figure. The chief deficiencies locally appear to be in ash, protein and fat.

The Incidence of Samples Testing Below the Legal Standard.

In a further study of the percentage distributions for fat and S.N.F. content given in the previous section, the following degree of deficiency of composition was found in the samples tested:—

11.77 per cent. of the total number of samples tested below 3 per cent. fat.

44.63 per cent. of the total number of samples tested below 8.5 per cent. S.N.F.

COMPOSITION OF MILK OFFERED FOR SALE IN PRETORIA.

3.51 per cent. of the total number of samples tested below 8 per cent. S.N.F.

It was also found that 5.2 per cent of the total number of samples were deficient in both fat and S.N.F., i.e. 39.43 per cent. were deficient only in their S.N.F. content, and 6.57 per cent. were deficient only in their fat content. The amount of milk below standard which is offered for sale appears to be high, especially with reference to the S.N.F. content. Municipalities do not prosecute dairymen for

TABLE IV.—Average Percentages of Fat and S.N.F. of Total Samples per Dairy and Percentage of Total Samples per Dairy deficient in Composition.

Dairy No.	No. of Samples.	AVERAGE TEST.		PERCENTAGE OF TOTAL NO. OF SAMPLES TESTING:—				
		Per-centage Fat.	Per-centage S.N.F.	(a) Below 3 per cent. Fat.	(b) Below 8.5 per cent. S.N.F.	(c) Below 8 per cent. S.N.F.	(d) Between 8 per cent. and 8.5 per cent. S.N.F.	(e) Below 3 per cent. Fat and 8.5 per cent. S.N.F.
1.....	38	3.7	8.51	2.6	47.4	2.6	44.8	2.6
2.....	38	3.7	8.60	7.9	31.6	2.6	29.0	5.3
3.....	33	3.6	8.57	3.0	33.3	0.0	33.3	3.0
4.....	38	3.3	8.73	10.5	7.9	2.6	5.3	0.0
5.....	38	3.8	8.56	0.0	36.7	0.0	36.7	0.0
6.....	38	3.5	8.50	2.6	44.7	2.6	42.1	0.0
7.....	38	3.6	8.38	7.9	73.7	5.3	68.4	7.9
8.....	32	3.3	8.61	25.0	31.3	0.0	31.3	3.1
9.....	38	3.4	8.50	10.5	52.6	7.9	44.7	7.9
10.....	32	3.3	8.39	21.9	75.0	3.1	71.9	21.9
11.....	38	3.2	8.56	21.0	34.2	2.6	31.6	7.9
12.....	38	3.2	8.55	7.9	39.5	5.3	34.2	2.9
13.....	38	3.3	8.62	23.7	28.9	2.6	26.3	10.5
14.....	38	3.6	8.56	0.0	39.5	2.6	36.9	0.0
15.....	38	3.1	8.58	34.2	34.2	2.6	31.6	13.2
16.....	38	3.4	8.54	13.2	47.4	5.3	42.1	7.9
17.....	38	3.2	8.40	23.7	68.4	5.3	63.1	21.0
18.....	38	3.3	8.70	12.9	29.0	3.2	25.8	0.0
19.....	31	3.75	8.64	2.6	28.9	0.0	28.9	0.0
20.....	38	3.6	8.60	0.0	39.5	5.3	34.2	0.0
21.....	38	3.4	8.45	0.0	60.5	5.3	55.2	0.0
22.....	38	3.3	8.50	21.0	50.0	2.6	47.4	13.2
23.....	37	3.3	8.39	13.5	70.3	10.8	59.5	7.9
24.....	29	3.6	8.60	6.9	37.9	0.0	37.9	0.0
25.....	38	3.2	8.68	13.2	28.9	0.0	28.9	5.3
26.....	38	3.2	8.48	15.9	47.4	5.3	42.1	13.2
27.....	37	3.4	8.44	10.5	52.6	5.3	47.3	5.3
28.....	38	3.7	8.55	5.3	39.5	2.6	36.9	2.6
29.....	38	3.5	8.30	2.6	81.6	10.5	71.1	2.6
30.....	38	3.3	8.66	21.0	28.9	0.0	28.9	7.9
31.....	38	3.2	8.52	23.7	50.0	7.9	42.1	5.3
32.....	38	3.3	8.53	18.4	44.7	2.6	42.1	10.5
33.....	38	3.4	8.58	2.6	42.1	0.0	42.1	0.0
34.....	38	3.5	8.57	7.9	42.1	5.3	36.8	2.6

Average percentage of samples per dairy below 3 per cent. Fat=11.95 per cent.

Average percentage of samples per dairy below 8.5 per cent. S.N.F.=44.8 der cent.

Average percentage of samples per dairy below 8 per cent. S.N.F.=3.5 per cent.

Average percentage of samples per dairy below 3 per cent. Fat and 8.5 per cent. S.N.F.
= 5.16 per cent.

selling milk deficient in S.N.F. unless the percentage of this constituent in the milk falls below 8 per cent. It will be noted that as much as 41.12 per cent of the samples analyzed had a S.N.F. test between 8 per cent. and 8.5 per cent.

In order to determine whether these deficiencies were confined to certain dairies only or were general, and whether the fault was seasonal or not, the results were further analyzed statistically in order to ascertain:—

(1) The percentages of the total samples per dairy testing below the various standards for fat and S.N.F.

(2) The percentages of the total samples per month, throughout the investigation, deficient in fat and S.N.F.

Table IV gives the average fat and S.N.F. content of the milk samples, taken from the 34 dairies included in the investigation, as well as the percentages of total samples per dairy below standard:—

An examination of the above table reveals that the average fat test per dairy ranges from 3.1 per cent. to 3.8 per cent., and that the average test for S.N.F. for one particular dairy falls as low as 8.30 per cent., the highest average being 8.73 per cent. Eight dairies have an average test for S.N.F. below the standard of 8.5 per cent.

A study of the percentages of total samples per dairy below standard shows again that the main deficiency in the milk is in the S.N.F. content. Thus, four dairies had no samples testing below 3 per cent. fat, ten dairies had no samples which were completely deficient, but no dairies were able to maintain the same standard as regards S.N.F. The percentage deficiency of samples per dairy below standard for S.N.F. ranged from 7.9 per cent. to as high as 81.6 per cent. The proportion of total samples per dairy testing between 8 per cent. and 8.5 per cent. S.N.F. varied from 7.9 per cent. to 71.9 per cent.

The following examples will show whether the total volume of milk handled by a dairy has any influence on the incidence of deficient samples, or not.

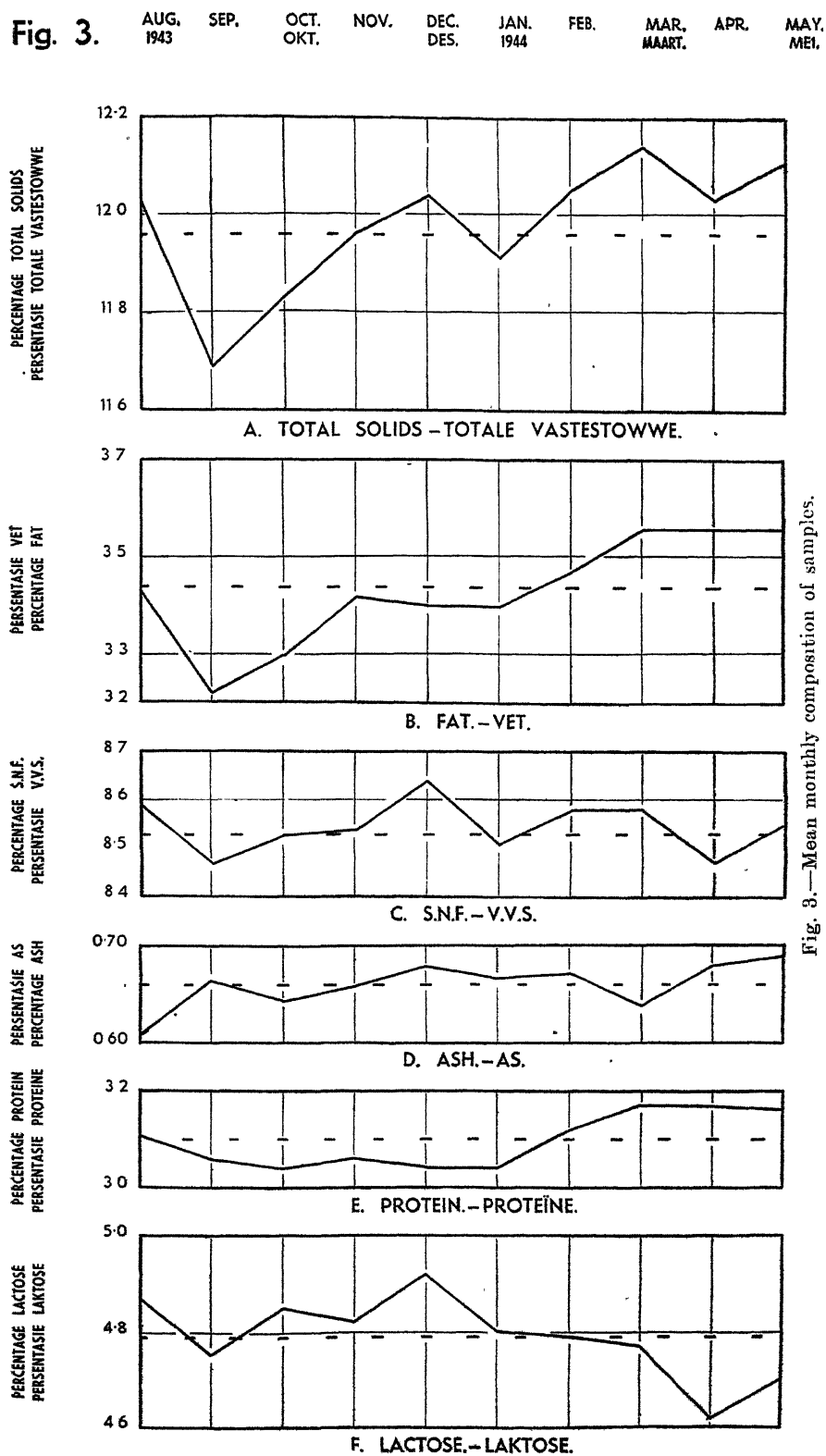
Dairies No. 6 and No. 20 had fairly large plants and received milk from a number of producers. Their records are as follows:—

Dairy.	AVERAGE TESTS.		PERCENTAGE OF TOTAL SAMPLES.		
	Percentage Fat.	Percentage S.N.F.	(a) Below 3 per cent. Fat.	(b) Below 8.5 per cent. S.N.F.	(c) Completely deficient.
No. 6.....	3.5	8.5	2.6	44.7	0.0
No. 20.....	3.6	8.6	0.0	39.5	0.0

Dairies No. 4, No. 29 and No. 31 each received milk from one herd only. None of these herds was registered under the Government Milk-recording Scheme. Dairy No. 4 was found to have one of the best general records. For example, it had the lowest percentage of total samples deficient in S.N.F. (7.95 per cent.). Dairy No. 29 had the poorest record as regards S.N.F., 81.6 per cent. of its samples being deficient in this constituent. Dairy No. 31 had the poorest general record.

THE COMPOSITION OF MILK OFFERED FOR SALE IN PRETORIA.

Fig. 3.



No. 5 and No. 19 were small depots which were drawing most of their supplies from two or more herds with milk of apparently high fat content. Dairies No. 15 and No. 17 also handled a small volume of milk. They, however, had the poorest records for fat content.

It is thus clear that in the larger dairies, where milk from a number of producers was bulked, the fat content usually averaged out to give a bulk supply above standard in this respect. The deficiency of S.N.F. in herd milk was, on the other hand, apparently so widespread that the bulk milk in these dairies often failed to average above 8.5 per cent. S.N.F. With the small dairies it was purely a matter of chance whether or not their producers supplied milk above standard. None of the small dairies had milk-testing apparatus, and only 6 out of the 130 herds from which Pretoria distributors drew their supplies during this period were tested under the Milk-recording Scheme. Thus, 95 per cent. of the suppliers were producing milk without ensuring that its composition complied with legal requirements. Municipal samples were taken too infrequently to provide sufficient information.

Whether this general deficiency was seasonal, or common throughout the year, is a further important point. Table V (illustrated by Figure II) gives details of this aspect of the problem.

TABLE V.—*Percentages of Samples per Month deficient in Composition.*

Month.	No. of Samples.	PERCENTAGE OF MONTHLY TOTAL TESTING BELOW :—			
		(a)	(b)	(c)	(d)
		3 per cent. Fat.	8.5 per cent. S.N.F.	8 per cent. S.N.F.	3 per cent. Fat and 8.5 per cent. S.N.F.
1943—					
August.....	102	14.6	38.2	5.9	7.8
September.....	136	22.1	53.7	5.1	6.8
October.....	136	10.3	45.6	1.4	5.1
November.....	170	11.2	41.7	4.6	4.1
December.....	102	11.7	51.0	0.0	3.9
1944—					
January.....	170	14.7	44.7	4.6	8.2
February.....	136	6.6	37.5	2.2	2.2
March.....	100	6.0	39.7	3.9	4.5
April.....	61	12.0	51.9	3.3	3.3
May.....	144	7.0	43.7	3.5	5.2

From the above results it will be seen that about 2/5 of the samples in any week were deficient in S.N.F. The graphs clearly show the large percentage of milk that tested between 8 per cent. and 8.5 per cent. S.N.F. and also the percentage of the monthly samples deficient in fat only.

S.N.F. deficiency did not follow any seasonal trend, although there was a slight tendency for the percentage of samples deficient in fat to decrease towards winter. (The question of seasonal variation will be dealt with more fully in a later section.)

Is the Composition of Milk Altered during Handling in the Milk Depot?

The composition of the milk sold by a distributor is, of course, largely dependent on the chemical quality of the milk he receives. This is, however, not entirely correct. During handling in the depot milk can have its composition altered in the following ways:—

(1) *Adulteration by watering.*—Watering of milk by dairymen or their employees still occurs, as is proved by the prosecutions for this offence that take place every month throughout the country.

(2) *Standardization.*—By the use of a specially adjusted separator, milk testing above 3 per cent. fat can be standardized to test 3 per cent fat. The percentage S.N.F. in the milk will also then increase proportionately. The removal of fat from milk intended for sale by skimming or standardizing is a legal offence.

(3) *Insufficient stirring or mixing of milk.*—Alteration of the composition of the milk by insufficient stirring was the fault most commonly encountered during the present investigation. Physically, milk is an emulsion consisting of a fat phase dispersed in a water phase. As the fat has a lower density than the water phase, the commonly observed phenomenon of "surface creaming" of milk occurs during standing. In order to make the product uniform again, thorough mixing by pouring the milk several times from one vessel to another, or by stirring well in a circular and up-and-down motion with a stirring-rod, is essential.

It was found that certain dairymen did not mix their supplies sufficiently. They appeared to believe that by simply pouring the milk once from one vessel to another, it would be mixed satisfactorily. Some did not stir the milk before it was cooled. They reasoned, incorrectly, that the milk would be sufficiently mixed over the cooler. When milk is pasteurized, the stirring of supplies in the receiving vats and the agitation during processing should be sufficient to ensure a uniform product. When the pasteurized milk is drawn off from the storage tanks, however, it should be well stirred. At a certain dairy, the milk of which was usually above standard, one sample taken from the bottling machine was found to be deficient in fat. It was subsequently found that the milk in the storage tank had not been thoroughly stirred before being drawn off.

Faulty mixing or stirring of milk occurred most frequently in the common type of counter can used for holding milk for counter sales. Milk is drawn from the can through a tap as required. This can is fitted with a hollow cylinder which passes through a hole in the middle of the lid of the can. A perforated disc is attached to the bottom of the cylinder. The cylinder is usually filled with ice in order to keep the milk cool. The milk in the can is usually stirred by lifting up the cylinder by the handle attached and plunging it into the milk once or twice. This is an unsatisfactory procedure, especially when the can is full, as the milk can only be made uniform by stirring well with a rod in a circular, as well as in an up-and-down, direction.

Many dairymen or their assistants do not stir the milk, even with the cylinder, every time a quantity is withdrawn. The result is that a customer who buys milk when the can is full, gets a product poorer in fat than one who comes in when the can is almost empty. The can is often not completely drained, when new milk

is poured in. The two or three pints remaining in the can from the previous milk, being rich in fat, increase the fat percentage of the milk now filling the can, this occurring throughout the day.

The effect of counter cans in altering the composition of milk is shown by results obtained in this investigation. The highest fat test (7.2 per cent.) was obtained from the almost empty counter can of a certain dairy whose fat average for the duration of the investigation (including the above sample) was 3.5 per cent.

All the samples testing 5.5 per cent. or above (nine in all) were obtained from counter cans of the above type. Many of the samples testing above 4 per cent. fat were taken from these cans. Should a municipal sample be taken from a half-empty can, it could thus hardly be representative of the milk-supply of a depot.

It would be far more satisfactory if milk for the counter trade was sold in cartons filled from a well mixed bulk supply. There would then be no danger of some customers receiving poorer milk than others.

The percentage of S.N.F. in the fat-free serum of a quantity of unadulterated whole-milk (i.e. in the skim-milk) remains constant, and is obviously unaffected by any removal of fat from such milk. The percentage of S.N.F. in the whole-milk, however, depends largely on the fat content; e.g., if a certain portion of the fat is skimmed off, a milk with a higher S.N.F. percentage will result. Thus if a milk testing 3.5 per cent. fat and 8.5 per cent. S.N.F. has its fat content reduced to 3 per cent., its S.N.F. content will be increased to ± 9.08 per cent.

Of the total number of samples analyzed, 11.77 per cent. were found to be deficient in fat, whereas 5.2 per cent. were deficient in both fat and S.N.F., i.e. 6.57 per cent. were deficient in fat alone. That is, the S.N.F. content of the latter samples was above standard. From observations made of the methods used in mixing milk in certain dairies, it is considered possible that most of these latter samples were found to be low only in fat on account of insufficient mixing of the bulk milk, which in this case resulted in an increase in the S.N.F. content.

Thus, a well mixed bulk milk testing below 8.5 per cent. S.N.F. may test above this standard after it has been left standing in a counter can for an appreciable length of time, if the sample is drawn from the bottom of the can.

It was indicated previously that the fat percentage of the samples varied much more than the percentages of the other constituents. From the foregoing remarks it appears that bad handling methods, which were largely responsible for the few very high and very low fat tests found, were thus also the cause of the greater variability in fat content.

Is there any Seasonal Trend in the Composition of Milk Sold by Distributors?

It is generally found that the winter milk of cows is richer in fat than the summer milk. In order to study any possible seasonal tendencies in the composition of milk offered for sale to the public, the average composition of the milk was calculated on a monthly basis. These results are given in Table VI, and shown graphically in Figure III. As this survey covered a period of ten months only, a complete study of seasonal variations in city milk could not be made. It is still possible, however, to indicate certain tendencies in the graphs and table following.

THE COMPOSITION OF MILK OFFERED FOR SALE IN PRETORIA.

TABLE VI.—*Mean Monthly Composition of Samples.*

Month.	Total Solids.	Fat.	S.N.F.	Ash.	Protein.	Lactose.
	%	%	%	%	%	%
1943—						
August.....	12.02	3.43	8.59	0.610	3.11	4.87
September.....	11.69	3.22	8.47	0.665	3.06	4.75
October.....	11.83	3.30	8.53	0.644	3.04	4.85
November.....	11.96	3.42	8.54	0.659	3.06	4.82
December.....	12.04	3.40	8.64	0.680	3.04	4.92
1944—						
January.....	11.91	3.40	8.51	0.667	3.04	4.80
February.....	12.05	3.47	8.58	0.672	3.12	4.79
March.....	12.14	3.56	8.58	0.638	3.17	4.77
April.....	12.03	3.56	8.47	0.680	3.17	4.62
May.....	12.11	3.56	8.55	0.692	3.16	4.70

It will be seen from the above data that there was a definite increase in the average fat test towards winter. S.N.F. tests were not higher in winter than in summer. The highest S.N.F. and lactose percentages were found in December, in which month there was also a rise in the mean ash content of the samples. The protein content increased from February onwards, from which month the lactose content showed a slight decrease.

The above results do not imply that all milks improved in fat or protein content towards winter. Some milks remained consistently poor. The findings on seasonal variation must be regarded as tentative. No definite conclusions can be drawn as regards the seasonal variations in the composition of milk supplies under South African conditions until data for complete periods of twelve months are available.

Summary and Conclusions.

(1) Between 16th August 1943 and 29th May 1944, altogether 1,257 samples of milk offered for sale by 34 Pretoria milk distributors were analyzed for total solids, fat and solids-not-fat. The ash, protein and lactose contents of 1,223 of these samples were also determined.

(2) It was found that the average percentages of the above constituents in local milk were lower than those given by investigators for milk in overseas countries, e.g. Great Britain and the U.S.A.

(3) 11.77 per cent. of the samples were found to be deficient in fat and 44.63 per cent. in S.N.F., while 5.2 per cent of the samples fell below the legal standard in all respects. 41.12 per cent. of the samples tested between 8 per cent. and 8.5 per cent. S.N.F.

(4) The percentage of total samples per dairy deficient in S.N.F. ranged from 81.6 per cent. to 7.9 per cent.; for fat the respective figures were 34.2 per cent. to 0.0 per cent.

(5) In the larger dairies receiving milk from a number of suppliers, the fat content of the bulk milk usually averaged above the legal standard. Deficiency in S.N.F. was so prevalent, however, that this bulk milk often tested below 8.5 per cent. In the case of small dairies receiving milk from only one or more suppliers, greater variations in fat content were found.

(6) Pretoria dairymen appeared to be quite unaware of the composition of their supplies. It was found that only two dairies had testing apparatus, and only 6 farmers out of the 130 who were supplying Pretoria with milk, had their herds tested under the Government Milk-recording Scheme. Thus, in nearly every case it was a matter of chance whether a farmer's supplies were above the legal standard or not.

(7) The effect of handling-methods on composition is discussed. The commonest fault found in this investigation was insufficient mixing or stirring of supplies, especially in the case of milk sold from counter cans.

(8) The average fat and protein contents of the milk appeared to increase towards winter, whereas lactose showed a slight decline. As the survey did not cover a full twelve-months period, definite conclusions cannot be drawn as to the seasonal variations occurring in the mean composition of milk supplies.

(9) From the foregoing it seems clear that the city milk-distributor in Pretoria is faced with a serious problem, that is, a milk supply deficient in solids and particularly solids-not-fat. What the position is in other large centres in South Africa or, for that matter, throughout the country, is at present not known. It does appear, however, that there may be good grounds for believing that many cows in South Africa secrete milk which falls below the legal standard for milk solids.

Acknowledgments are due to:—

(1) The Dairy Industry Control Board which provided the funds necessary for this investigation; and

(2) the proprietors of the 34 dairies who supplied the samples for analysis.

REFERENCE.

W. L. DAVIES (1939). The Chemistry of Milk (2nd Edition). Chapman and Hall, Ltd., London.

Sale of Blowfly Spray.

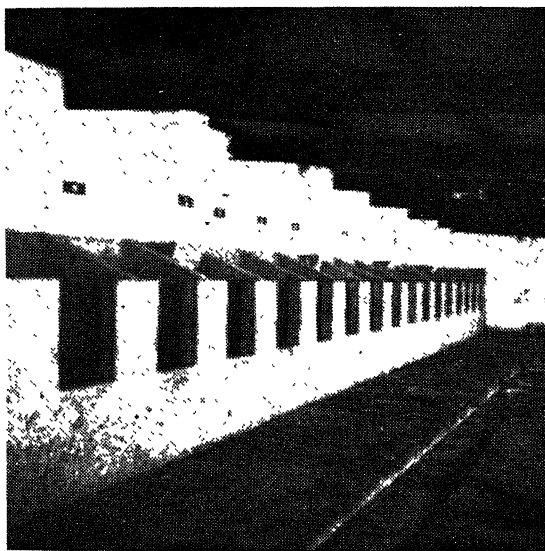
As from 1 June 1946 Blowfly Spray will be available in one (1) gallon and five (5) gallon drums at 6s. and 23s. respectively. These prices include the drums, which become the property of the buyer of the spray and will not be accepted for refilling. Possessors of 25 to 45 gallon drums may forward these, railage paid, to the Director of Veterinary Services, Onderstepoort, Pretoria North station, to be refilled. The name and address of the sender must be painted clearly on the drums. No unmarked drums will be received. The price of Blowfly Spray in such owners' drums is 3s. 6d. per gallon.

A Manger for Dairy Cows.

E. H. Penzhorn, Animal Husbandry Research Officer, Summer-Cereal Experiment Station, Kroonstad.

THE serious shortage of grain and roughage makes it increasingly imperative that even the latter should be used to the best possible advantage.

In order to prevent wastage and ensure the maximum utilization of feeds such as maize plants, hay and other roughage, the feed is cut up in many cases and fed to the animals in mangers. Even in these cases it is impossible to prevent wastage altogether, since the animals push the feed from the mangers.



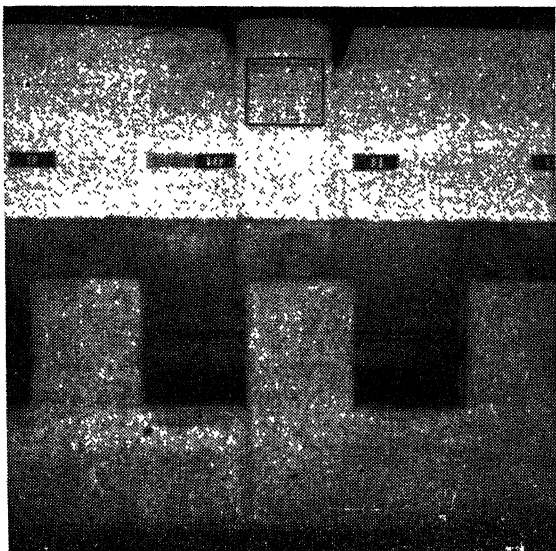
1. The milking shed—manger, floor and draining furrow.

To prevent this type of loss, a manger was built at the Summer Crop Experiment Station, Kroonstad, which obviates practically all wastage. This manger is described below.

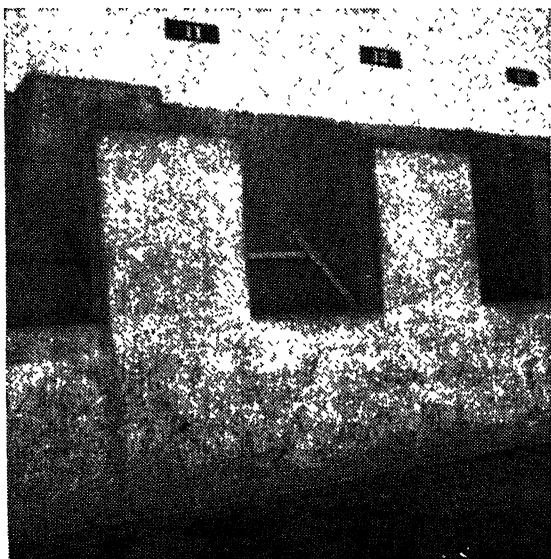
The manger was built under a lean-to against the wall of a shed. The front and section walls are single-brick walls plastered in cement. For additional strength, the upper 9 inches of the front wall, forming the edge of the manger, is cast in concrete along its entire length. The tying-rings for the cows are embedded in this concrete. Three inches from the inside of the walls, in front and at the back, 1 inch galvanized water piping runs along the whole length of the manger, and on either side of each section. The front ends of the latter are bent round the long pipe and secured with bolts; at the back the piping is let into the shed wall to a depth of a few inches. These pipes prevent the feed from being tossed up over the sides of the manger, and for the same reason the front corners of each manger are built in.

The cows are tied with muzzle halters and short chains to keep their heads in the mangers. The tying-rings are low and fixed to the inside so that the cows have complete freedom of movement in the manger.

The dimensions of the mangers were taken arbitrarily but they proved to be adequate for Jersey cows, which were used in the experiments. The length of the mangers was determined by the length of the lean-to. Twenty cows had to be fed and the available space was



2. The manger—from the front.

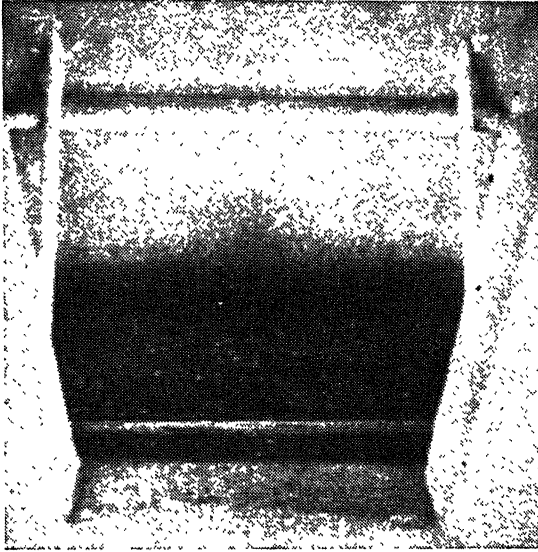


3. The manger—at an angle—to show the position of the pipes.

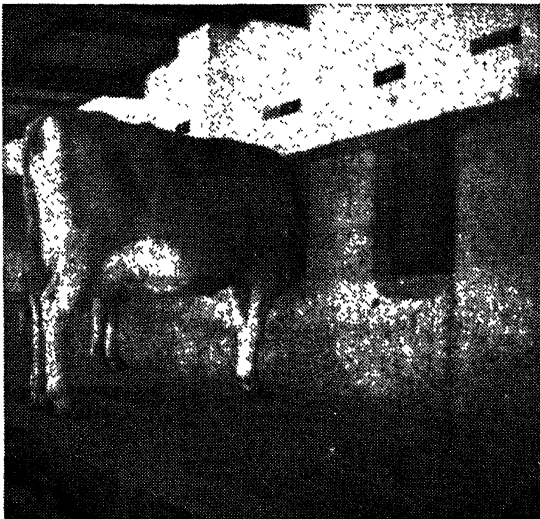
divided by 20, which worked out to 39 inches per cow. In front of the manger there are no partitions between the cows. Since the cows are tied so close, the manger must be built up to a convenient height for the animals.

A MANGER FOR DAIRY COWS.

These mangers have been in use for 6 months and have proved most effective. The quantity of fodder wasted is negligible. The amount saved in fodder, justifies the higher building costs involved.

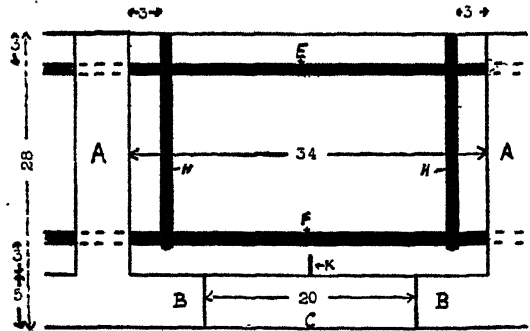
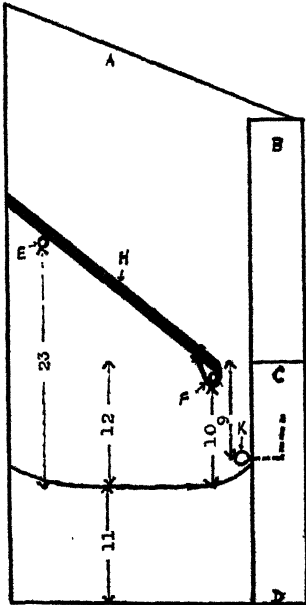
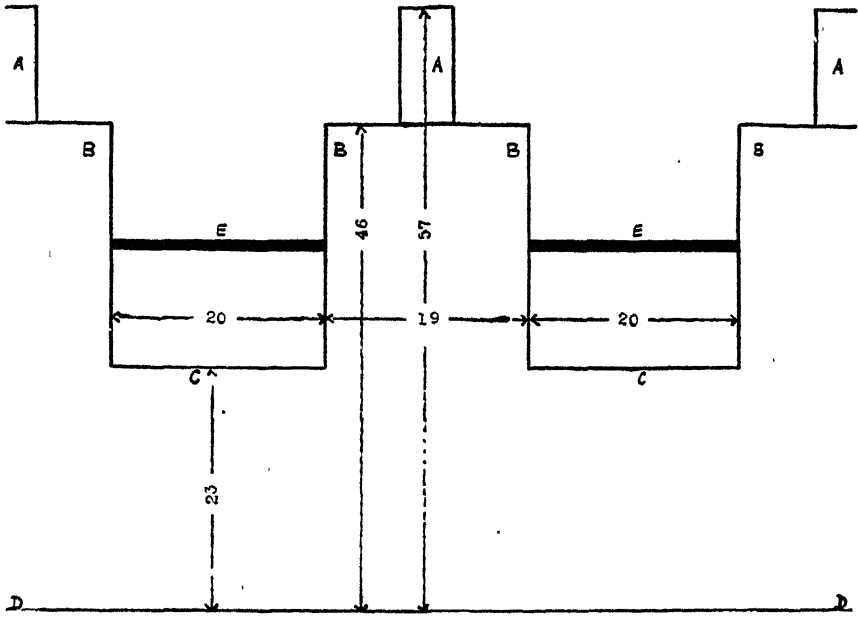


4. The manger—from above—to show the position of the pipes.



5. Cow—tied to the manger.

The manger would possibly be improved by rounding off the corners at the bottom. Since the heads of the animals are "boxed in" as it were, they are apt to move their bodies when any movement takes



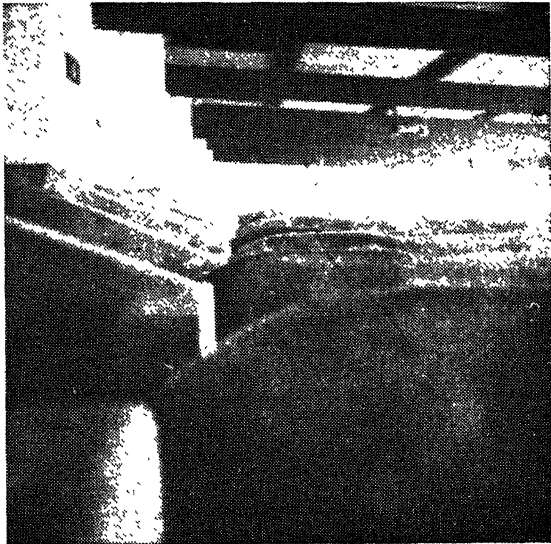
PLAN.

A Manger for Dairy Cows.

- A—partition.
- B—corner walls.
- C—front edge of manger.
- D—floor level.
- E, F, H—pipes.
- K—tying-ring.

place behind them, e.g. when people walk past. This will be prevented if the front corners of the mangers are not built up so high and if the partitions are strengthened in some other way.

The cows received roughage once daily. They were tied to the mangers for about $3\frac{1}{2}$ hours in the mornings and in the evenings. During the intervening period they were kept in a bare camp nearby where they had free access to clean drinking water. During this



6. Position of cows at the manger.

time the cows could eat their fill and the capacity of the manger was sufficient. The fodder left over in the manger was removed daily and fed to dry cows or other animals.

Use of the Manger.

The manger is of special value for testing out rations. It is felt, however, that the practical farmer may also find it worth while in these times of scarcity to grind his roughage and feed it to the animals in a manger of this type.

Concentrates are fed according to production, and it may also become necessary to ration roughage. By feeding cows individually, it is possible to give higher producers a larger percentage of the better quality roughage. Roughage of a poorer quality may be adequate for low producers and cows with a decreasing production. In this way the available feed supplies can be used to the best advantage. Dairy farmers who have to buy all their feeds will derive particular benefit from this manger, but even those farmers who produce their own roughage will profit by the effective feed utilization.

Acknowledgment.—The writer wishes to thank Mr. I. J. Smuts, professional officer of the Summer Crop Experiment Station, for his kind help, and practical hints on the building of the manger.

Salt Poisoning in Stock.

Dr. Douw G. Steyn, Onderstepoort.

IT frequently happens that stock, particularly cattle and sheep, suffer from salt poisoning as a result of the excessive ingestion of salt. Animals which have for long periods had no access to salt licks are inclined to eat salt very greedily and consequently suffer from, or succumb to, salt poisoning. Livestock, particularly those which graze exclusively on grass-veld, develop a very strong craving for salt during autumn and winter and in spring before rain has fallen (i.e. from about April to October). During these months, the nutritive value of grass-veld is very low, especially in so far as phosphates and proteins are concerned, and consequently the animals develop a pica, which manifests itself in the eating of bones, tins, rags, etc. It is when animals are subject to this pica that they tend to eat too much salt if they are not constantly given free access to a salt bone-meal lick or to other licks containing phosphorus.

Symptoms of the Disease.

The course of the poisoning depends upon the quantity of salt eaten. The animals may, for instance, die suddenly or they may develop the following symptoms within a few hours or more of eating the salt: excessive thirst, tendency to vomit, nervous twitching, loss of appetite, and diarrhoea. They may die within a few hours or a few days of eating the salt and/or drinking water.

Post-mortem Lesions.

If the animals have been ill for a day or two before dying, the stomach and intestines will be inflamed.

In cases of suspected salt poisoning, about one pound of the contents of the rumen or first stomach and one pound of the contents of the abomasum and small intestine should be placed in separate bottles and sent to the Director of Veterinary Services, P.O. Onderstepoort, for examination. The dung and urine of affected animals may be sent in separate bottles for analysis. If, in addition, there is a possibility of poisoning due to other toxins, one or two pounds of the liver should be sent for examination together with the stomach contents (in separate bottles) and one to two pounds of bones and skin. A detailed description of the symptoms and post-mortem lesions and a statement of the time elapsed between the setting in of the disease and the taking of the samples are absolutely essential. *A sum of two shillings is charged for examining the samples of each animal. This fee is payable only in cases of suspected poisoning and the analysis of articles of food; all other samples are examined free of charge.*

Treatment in Cases of Salt Poisoning.

The chemical antidote to salt poisoning is silver nitrate, but unfortunately its administration is attended by certain difficulties. For the effective use of silver nitrate in cases of salt poisoning, large quantities are required, and since it is a strong irritant it must be greatly diluted (1/10 per cent.) before being administered. The quantity of water required for diluting the silver nitrate will therefore be so large that it will be almost impossible for the animals to

drink all of it. In order to determine how much silver nitrate to administer, it is necessary to know more or less how much salt the animal has ingested, and this is of course no easy task. If too much silver nitrate is administered, there is danger of poisoning the animal. In addition, it is necessary to dissolve the silver nitrate crystals in rain water or distilled water, since the chloride contained in tap water (or subterranean water) precipitates the silver nitrate.

From the abovementioned facts it is clear that effective treatment of salt poisoning with silver nitrate is not very practicable.

Farmers should therefore confine themselves to the following general treatment:—

(a) The animals must be given an effective purgative to empty the bowels before being allowed to have any water. In this case, castor oil (two to eight ounces for sheep and eight to thirty ounces for cattle, according to size and age) is the most effective purgative. It is better for the animals to have small quantities of water repeatedly, than to drink their fill at any one time. If at all possible, the animals should be given barley water or linseed decoctions instead of pure water.

(b) When the bowels have been evacuated, the animals should be given carron oil (two to six ounces for sheep and six ounces to one pint for cattle, according to size and age) twice daily. Carron oil is prepared by mixing equal parts of raw linseed oil and lime water and shaking the mixture well.

(c) To strengthen the action of the heart, very strong black coffee (the same dose as prescribed for castor oil) should be administered three times a day. Four tablespoons of sugar should be dissolved in every pint of coffee.

A bulletin containing detailed instructions for the treatment of cases of poisoning is obtainable from the Director of Veterinary Services, P.O. Onderstepoort.

Prevention of Salt Poisoning.

Salt poisoning may be prevented—

(a) by giving animals regular access to salt bone-meal licks or salt phosphate licks;

(b) by not giving stock a pure salt lick.

Pure salt licks are particularly dangerous to stock during autumn and winter and before rain has fallen in spring, since the nutritive value of the veld (more especially of pure grass-veld) is very low during these seasons and animals therefore experience a deficiency of various elements (particularly phosphate and protein), with the result that they are inclined to eat too much salt.

This makes it imperative that bone-meal licks (one part salt to two or three parts bone-meal) or other phosphate licks should be given to stock. Detailed information in connection with the feeding of licks to stock is obtainable from the Director of Veterinary Services, P.O. Onderstepoort.

Infectious or Contagious Abortion in Cattle.

G. B. Sutton, Division of Veterinary Services, Onderstepoort.

Contagious abortion is a disease of cattle in which the main symptom is abortion without any other signs of disease.

Cause and Mode of Infection.

The usual cause is a bacterium called *Brucella abortus*.

Infection generally takes place through the mouth as a result of the ingestion of food or water which is contaminated with the germ. The aborted calf, afterbirth and discharges from the infected cow contain large numbers of the germs which can contaminate the food, water and places or objects with which they come into contact. The animal can also become infected directly by eating afterbirth material or licking aborted calves. The infection can also be contracted through the conjunctiva, vagina, or wounds in the skin should the germ come into contact with any of these from contaminated byres, bedding or other objects.

The bull may transmit the disease if he actually has it himself, but rarely does so. Mechanical transmission from cow to cow by the bull during service can practically be excluded.

From the above it will be seen that the infected animal is the main source of danger in spreading the disease.

Under favourable conditions the germ is able to live for at least three months in the veld, and in kraals, byres or sheds. Such places, if contaminated, are potentially dangerous for some time.

Symptoms.

Abortion is the only outward sign of the disease; otherwise the animal appears perfectly healthy. Generally an infected cow aborts once only, usually between the 5th and 8th month of pregnancy. The abortion can occur earlier and, in cases where the calf is still very small, the abortion may not be noticed. The next calf is usually a weak one which may not survive. The third pregnancy usually results in a healthy calf. Some individual cows may continue aborting for a number of pregnancies. Some infected cows may not abort at all. The afterbirth is frequently retained and, unless it is removed and suitable treatment given to the cow, sterility may result. In a few cases watery swellings develop in the knee or other joints. In most cases the organism infects the udder without any noticeable change being visible. The milk contains the organisms.

In the bull the germ generally locates itself in the sexual organs, particularly the testicle which becomes enlarged and hard.

When the disease first affects a herd, it spreads rapidly and numerous abortions occur. No healthy calves may be born for 18 months or longer. Then the abortions become less frequent until eventually there are only a few each year.

Diagnosis.

Contagious abortion can be identified by testing the blood of the animal.

Here it must be stressed that a positive result is practically a certain indication of infection, but a negative test cannot be held to exclude infection. Sometimes a badly infected cow does not show

a positive reaction to the test at the time of abortion, but only two to 3 weeks later. Thus, if a cow which is tested shortly after abortion, gives a negative test, she should be retested 2 to 3 weeks later.

Blood samples may be sent to the Director of Veterinary Services, P.O. Onderstepoort, Transvaal, or to the Officer-in-Charge, Allerton Laboratory, P.O. Box 405, Pietermaritzburg, Natal. They are tested free of charge. Small bottles containing a preservative for collecting blood can be obtained on application from either of the above addresses. These remain suitable for collecting blood indefinitely, provided that they are not opened.

It is extremely important to mark all samples submitted with the name and address of the sender and it should be stated clearly that they are to be tested for contagious abortion.

How to Take the Blood Samples.

The blood is taken from the jugular vein, which lies in the groove situated in the lower half of the neck on either side. This vein must first be made visible and the blood dammed up by putting a riem or rope loop round the neck as close to the shoulders as possible, and pulling it tight. After a few seconds the vein swells up and can be seen or felt. It will show best if the head of the animal is lifted and the neck stretched out. The skin must be cleaned or disinfected over a small part of the vein with clean water or methylated spirits. A fairly large hypodermic needle is taken and pushed through the skin into the vein. The blood will flow out of the needle and can be collected in the specimen bottle until this is about $\frac{2}{3}$ full. The blood preservative must be left in the bottle and the blood just added to it. The bottle is now well corked and allowed to stand for about an hour in a cool place so that the blood can clot before it is sent off. If bottles with preservative are not available, any clean, dry bottle could be used for collecting the blood. Only a small quantity of blood is required, enough to fill a small wine glass being sufficient. All specimen bottles must be clearly marked with some distinctive number or name so that it can be known from which animal the blood came.

The hypodermic needle used for tapping the blood must be cleaned and opened by passing through it the small piece of wire which is sold with it, and then boiled in clean water for 15 minutes before it is used.

Treatment.

Up to the present no effective cure or remedy for the disease is known.

The vaccine does not cure animals. It only protects healthy animals against the disease.

The discharges of the animal which has aborted should be cleaned up, the afterbirth removed if it is retained, and the animal kept separate from the rest of the herd until there is no more discharge from the vagina.

Control and Prevention.

In a limited number of cases, particularly on studbreeding farms, it is possible to combat the disease by testing all cattle once a year and eliminating all animals that are found to have the disease.

If a herd is free from the disease, the owner cannot be too careful in trying to keep it free. The main thing to guard against is contact with infected cattle. The usual way in which the disease is

introduced is by bringing an infected animal into the herd. No animal should be purchased unless it has first been tested for contagious abortion. It should then be kept apart from the other breeding animals for a further 3 months and be retested before it is allowed to join the herd. The use of vaccine in a clean herd has the disadvantage that the inoculated animals become positive to the blood test for the disease. This means that it can no longer be ascertained whether the animals are free from the disease or not.

If the clean herd is in an area where the disease is prevalent or is likely to be exposed to the disease, it would be advisable to use the vaccine. Only vaccine made from the American Strain 19 should be used. *No other vaccine should be used. Furthermore it should be used only on calves between the ages of 4 to 8 months.* In this way an immunity to the disease will be built up in a few years in the herd. The majority of the calves will become negative to the blood test after 3 to 6 months, some after a year, and an odd exceptional calf will remain positive to the test throughout its life. Adult animals should not be inoculated, as many of them are likely to remain reactors to the test for the rest of their lives.

In an infected herd the method recommended for control is the use of the vaccine (Strain 19). Inoculate all calves between the ages of 4 to 8 months and all non-pregnant cattle. No animal should be put to the bull until two months after the inoculation. Pregnant cattle should not be inoculated. Allow them to calve first and inoculate them shortly afterward, keeping them away from the bull for 2 months after inoculation. As the calves born in the herd reach the age of 4 to 8 months, they should be inoculated. Bull calves up to 1 year of age can also be inoculated, but it is not advisable to inoculate older bulls. Infected animals and those which have aborted, should not be inoculated. Animals need only be inoculated once during their lifetime. Vaccination should be combined, if possible, with the elimination of infected animals, especially if they are no longer profitable to keep. All animals introduced into the herd should be inoculated, unless they are pregnant, when they should be treated shortly after calving.

Other methods such as testing together with either elimination or isolation of infected animals are expensive and seldom practicable under South African conditions.

The vaccine can be obtained from the Director of Veterinary Services, P.O. Onderstepoort, Transvaal, at 4d. per dose. Full directions for use accompany the vaccine.

In addition, it is important to take proper hygienic measures to prevent the spread of the disease. All aborted calves, afterbirth material, soiled bedding or anything of that nature should be collected and destroyed by burning or burial. Food and water should be prevented from becoming contaminated. Stables, sheds or other buildings should be disinfected. Cows which have aborted should be kept separate from the others.

The possibility of other animals and human beings becoming infected should also be considered. Milk from infected herds should not be used for human consumption unless it has been pasteurized or boiled. Pigs should not be fed with such milk unless it has been boiled.

Other Causes of Abortion.

Among the most important of these are two organisms called *Vibrio foetus* and *Trichomonas foetus*, respectively. They are not

Overheating and Chilling of Chickens.

J. D. W. A. Coles, Research Officer, Onderstepoort.

IF anybody were to ask what single cause is responsible for the greatest number of deaths among chickens, the answer would deal exclusively with the temperature of the brooder. Infectious diseases do wipe out chickens by the thousand, but incorrect temperatures are responsible for very many more deaths. The usual story is: "I put a magnificent lot of chicks in the brooder-house, and now they are dying like flies. Some have diarrhoea, while some just twist their necks, stagger and then die. I'm sure it must be bacillary white diarrhoea". The cause is a far simpler thing than bacillary white diarrhoea, and the following description reveals the essential details.

Symptoms.

Overheating.—The chicks get as far away as possible from the source of heat, but later may even approach it. The wings are outspread. The chicks gasp, sweat and have an offensive odour. Some get diarrhoea, and die; others get spasms of various muscles, and twist their necks, etc. Deaths may occur at any time within about a month after the exposure to excessive heat, though most deaths take place within three or four days. Survivors have their growth checked, and the adult flock is weakly and uneven in size.

Chilling.—The chicks huddle so close together that those in the middle of the clump, or those that get pushed into the corner, are crushed to death. Those that are alive in the morning look mopy, and soon develop diarrhoea. Death may occur in anything up to about a fortnight, though here again most succumb during the first few days. Survivors grow unevenly, and never make a flock that the owner can be proud of. They usually develop into culls.

Diseases Mistakable for these Conditions.

Other diseases which can be mistaken for these conditions are the following:—

Bacillary White Diarrhoea.—If some of the chicks are dead in the shell, if others hatch, look sick, and die on the first day, and if deaths are fairly numerous during the first week after hatching, you are justified in suspecting bacillary white diarrhoea.

Bacillus aertrycke infection.—This is an infectious disease sometimes seen in chicks about one to three weeks old. The symptoms rather resemble those due to overheating, and a bacteriological examination of the blood is necessary before it can be said definitely whether the disease is present or not.

Aspergillosis (Brooder-house pneumonia).—To-day this is rarely seen. The disease usually attacks chicks in damp, musty brooder-houses, especially if the litter is at all mouldy. The causal mould will be found when material is examined microscopically.

Aegyptianellosis.—This is sometimes seen in chicks two to three weeks old. The chick is very mopy, and has a bright-green diarrhoea. The disease is due to a blood parasite transmitted by the tampan, and is very fatal.

Spirochaetosis.—This is occasionally seen in chicks over a week old. They are mopy and have a greenish diarrhoea. The blood

parasite causing it is transmitted by the tampan. The disease is usually fatal.

All the above-described diseases can be established definitely by an expert only.

Avoidance of Mortality due to Chilling and Overheating.

To avoid mortality due to chilling and overheating:—

Do not let the chicks out on a bright morning when the air is still chilly.

Do not expose chicks to draughts, but provide good ventilation. The temperature required by chicks under the hover during the first week is 90 to 95° F., during the second week, 85 to 90° F., and in the third week, 80 to 85° F., while in the fourth and fifth weeks it should not deviate more than a degree or two from 70° F. The temperature in the brooder-house during the first 6 or 7 weeks should not fall below 65° F.

Visit the chicks as often as possible during the day and night, to see that they are comfortable and not crowding together or gasping for fresh air. Most chickens brooded in boxes in kitchens are chilled between 3 and 6 a.m.

Infectious or Contagious Abortion in Cattle:—

[Continued from page 476.]

common in South Africa. To find out whether these organisms are responsible, smears should be made on glass slides from the discharges of the cow or afterbirth. These, together with either the whole aborted calf (if it is small enough) or its stomach, should be sent to the Director of Veterinary Services, P.O. Onderstepoort, for examination. The calf or its stomach should be sent in 50 per cent. glycerine to preserve it and be clearly marked that it is intended for examination for abortion organisms.

Other conditions which can cause abortion are the following:—

- (1) Any disease setting up a high fever.
- (2) Bodily injuries or bruises.
- (3) Hereditary factors in either the male or female.
- (4) Nutritional conditions.
- (5) Unknown causes.

It should be remembered that up to 2 per cent. of abortions can be expected in a herd without any definite disease being responsible. Twins also are frequently aborted without anything being wrong.

Appropriate Use of Wood Preservatives.

M. H. Scott, Chief Forest Products Officer, Forest Department, Pretoria.

MUCH has been written in the press and elsewhere recently about the preservation of timber against the numerous wood destroying agencies such as wood-boring beetles, termites, fungi and decay. It is felt, however, that a brief summary of the various classes of preservatives, the properties, methods of application and appropriate uses would be of special value at the present time to guide the public generally in the selection of suitable preservatives. It may be noted in this connection that Government Notice No. 569 of 15 March 1946 requires all wood susceptible to attack by the European House Beetle (*Hylotrupes bajulus*) and the Powder Post Beetle (*Lyctus* spp.) to be protected by preservative treatment before use.



Open-tank treatment of poles.

It should be emphasized that effective treatment against these and other wood-destroying agencies can only be ensured if the correct preservative is applied in such a manner that adequate penetration and absorption for the purpose in view is obtained. In no case can wood that is insufficiently dry be effectively treated without very prolonged soaking under special conditions.

It is widely recognized that laboratory tests, while serving as a measure of toxicity of wood preservatives to fungi and termites, do not necessarily serve as a means of assessing the value of a preserva-

tive under practical conditions, especially if used on timber exposed out of doors to the influence of the weather. The classification is therefore based on results obtained during twenty-five years' experimental work on over a hundred different preservatives under all kinds and conditions of exposure most favourable for wood-destroying agencies, including termites, wood-boring beetles, weathering and decay.

Further details of the various treatments are given in other departmental publications or can be obtained from the Forest Products Institute, Pretoria West.

Wood preservatives in general use may be classified under one of the following heads:—

Class A.—Creosotes.

(1) These preservatives, which are used to a greater extent than any other, consist essentially of distillates from coal-tar.

(2) They vary considerably in composition and in order to establish definite compositions a South African Standard Specification for Carbolineum and Creosote for the Preservation of Timber, S.A.S.S. No. 17 of 1943, was prepared.

(3) They are the most thoroughly tested and most satisfactory as regards permanence and resistance to leaching.

(4) They are not corrosive or readily inflammable at normal temperatures.

(5) Wood containing these preservatives cannot be painted for some time after treatment. A bitumastic base aluminium paint can, however, be used within a few months, while other paints can only be used after some years of exposure.

(6) They have a characteristic odour which can be acquired by certain foodstuffs such as fats and tea, although there may be no actual contact with the treated woods.

(7) They are especially suitable for exterior use and for all work in contact with the ground, and also for certain interior work.

Class B.—Aqueous Solutions.

(1) These consist essentially of a preservative dissolved in water to give a solution free from deposit.

(2) They may consist of a single salt such as the commonly used zinc chloride, or zinc sulphate, or of a combination of salts such as Wolman Tanalith.

(3) They are permanent only in dry conditions or when protected from the weather by means of paint or other covering.

(4) They are non-inflammable, but some are corrosive to metals.

(5) They are mostly colourless, but some stain the wood. Wood treated with them can, however, be painted when dry.

(6) Although mostly odourless, they should be used with the greatest caution on wood which will come into contact with foodstuffs, as some of them contain poisons.

(7) They are especially suitable for interior use on any work which has to be painted.

(8) It is necessary in most cases to stack the wood for redrying after treatment.

Class C.—Organic Solvents.

Sub-class C 1.

These consist essentially of a solution of a preservative substance in some comparatively non-volatile solvent, e.g. 5 per cent. pentachlorophenol in fuel oil.

(1) They are non-corrosive and not readily inflammable at normal temperatures.

(2) They are permanent and resistant to leaching.

(3) Woods containing these preservatives cannot be painted for some time after treatment.

(4) They have a characteristic odour which can be acquired by certain foodstuffs.

(5) They are especially suitable for exterior use and all work in contact with the ground.

Sub-class C 2.

These consist essentially of a solution of preservative substance in a volatile oil such as 5 per cent. pentachlorophenol or 10 per cent. copper or zinc naphthenate in white spirit.

(1) They are resistant to leaching and therefore permanent and suitable for both inside and outside use.

(2) They are usually non-staining, and wood treated with them can be painted.

(3) The solvents used are generally inflammable and care is necessary in using and storing them.

(4) Although some are odourless, they should not be used on wood which is likely to come into contact with any foodstuffs.

(5) It is not necessary to stack for redrying after treatment.

(6) The treatment should not be carried out in confined spaces where there is a lack of ventilation.

Methods of Application.

The following methods of application are in general use, but, no matter what methods are used, the best results will not be obtained unless the wood to be treated is sufficiently dry. A moisture content of not more than 25 per cent. is recommended.

In this connection it should be noted that it is only the sapwood which can be fully penetrated by preservative solutions. Heartwood, even under severe pressure treatment, receives little more than a surface coating, except on the end grain.

(1) Surface treatment by brushing, spraying, or dipping.

Good results are obtained by this method only on the sapwood of coniferous timbers and Limba (*Terminalia superba*) with the sub-class C 2 preservatives, provided good penetrating oil such as white spirit is used.

Surface treatments with classes A and B and sub-class C 1 preservatives on any woods, and with sub-class C 2 on most hardwoods, are of very limited value, and liberal application of the preservative is essential to make treatment worthwhile.

(2) Open tank hot-cold treatment.

Good penetration and absorption have been obtained on all woods by this method with preservatives A, B and C, provided the temperatures and times recommended are adhered to. In the case of sub-class C 2, preservative temperatures should never exceed 120° F. and this is high enough for adequate penetration. An alternative method with these preservatives for the treatment of small articles such as floor blocks is to dip the heated blocks into a cold solution.

(3) Vacuum and pressure treatment.

This is generally the most satisfactory method where plant is available. It can be used with any preservative, very mild pressures only being necessary for the sub-class C 2 preservatives. Schedules as laid down should be carefully followed.

EXAMPLES OF WOOD PRESERVATIVE TREATMENT.

Item.	Class of wood product.	Preservative recommended.	Preservative process recommended.
1	Timber in direct contact with the ground or damp foundations or timber used under particularly adverse conditions, e.g. telephone and electric transmission poles, sleepers, bridge timbers, culverts, fencing, etc.	Class A and classes A and C 1 combined	Vacuum and pressure or hot-cold open tank process. Minimum absorption: 8 lb. per cub. ft. for pine, and 5 lb. per cub. ft. for hardwood with full penetration of sapwood. For details, see Forest Department Bulletin No. 30.
2	Timbers not in direct contact with the ground but which may be exposed to weathering and leaching and which will not be painted after treatment, e.g. beams and joists to floors near wet ground, outside walls, verandah poles.	Class A, sub-class C 1 and classes A and C 1 combined	Vacuum-pressure or hot-cold open tank process. Minimum absorption 4 lb. per cub. ft. for pine and 2 lb. per cub. ft. for hardwood with optimum penetration.
3	(1) Timber, not in direct contact with the ground but exposed to the weather, which will be kept well painted after treatment, e.g. weatherboarding, rails, notice boards. (2) As above for pines only..	Class B and sub-class C 2 Sub-class C 2.....	Vacuum-pressure or hot-cold open tank process. Minimum absorption of 0.3 lb. dry salt per cub. ft. with optimum penetration. Cold dips, heavy spraying and brush coating.
4	Interior woodwork and all wood to be used in dry places, e.g. flooring, joists, joinery, skirting, roof timbers, furniture and packing cases other than shown in 5 below.	Class B and sub-class C 2.	As for 3 above.
5	Shooks and boxes to be used for purposes of packing food.	Class B.....	Vacuum-pressure or hot-cold open tank treatment in either zinc chloride or zinc sulphate. Absorption or penetrations as shown in 3.

Visceral Gout of Fowls.

J. D. W. A. Coles, Research Officer, Onderstepoort.

INVESTIGATIONS into poultry diseases in South Africa have thrown a good deal of light on what was formerly considered an ailment of minor importance. It is now known that this disease, visceral gout, is widespread in the country, can manifest itself in a number of ways hitherto not recognized, and is most serious from the economic point of view. The following description will enable poultrymen at least to suspect that it may be ravaging their flocks. It can be confused with so many other conditions that the farmer will be well advised not to accept the responsibility for a diagnosis made by himself.

Occurrence.

Visceral gout usually occurs in the spring, summer and early autumn. It has been diagnosed not only in South Africa, but also in India, the United States and England. In its characteristic form it appears in a flock suddenly, and nearly all the fowls may be seriously ill within two or three days. In other outbreaks only four or five fowls sicken daily over a period of even a month or more. Both males and females are susceptible, but it is doubtful whether it occurs in chicks less than two months old. It is quite a common thing for one or two pens to escape completely, while fowls even in adjoining pens succumb to the disease.

Cause.

In spite of numerous experiments, the cause of visceral gout is still absolutely unknown. All attempts to reproduce it have failed. It is the constant endeavour of the Government to assist poultrymen, and for this reason it will be greatly appreciated if farmers would forward immediately a comprehensive description of any-suspected outbreak of visceral gout. The letter should be addressed to the Director of Veterinary Services, P.O. Onderstepoort, Pretoria. The information will be of use in the search for the cause of the disease.

Symptoms.

The usual thing is to find a number of birds all getting sick at once. They stand moping with eyes closed, and there is usually a watery diarrhoea. The crop is distended with sour smelling food. The feathers are ruffled and the comb is usually dark, becoming almost black just before death. The bird gets very sleepy and generally dies in a comatose condition. There is increased thirst and loss of appetite. Before death the fowl gets very cold. There is a sharp drop in the total egg yield of the flock, even when the great majority of the fowls look normal, and soft eggs may be found under the perches in the morning. The fowls may smell badly of stagnant fowl manure. In severe outbreaks almost all the sick fowls are dead within two days; in other outbreaks the mortality is extremely low and the birds recover in about ten days. Egg-production generally returns to normal within a month, unless the birds go into a moult.

Post-mortem Appearances.

In cases that are rapidly fatal, practically nothing abnormal can be detected. The crop is full. There is a catarrh of the intestines, and the liver and kidneys are full of blood and very dark in colour. The spleen is normal or subnormal in size. A burst yolk

may be found lying in the abdominal cavity. When the fowl lives three or four days after becoming ill, a peculiar condition is often observed: *The surface of the heart and the heart sac, the liver, and the coils of the intestines look as if they have been sprinkled liberally with powdered chalk.* It is this peculiar feature which has led to the name visceral gout, which suggests the presence of uric-acid compounds deposited on the internal organs.

Treatment.

Administer a dessertspoonful of olive oil, and then massage the crop gently, to mix the contents with the oil. Put the sick birds in a warm, comfortable coop out of the sun, and give them all the water and milk they desire. Morning and evening each bird should get as much sodium bicarbonate as may be heaped on a sixpenny piece; administer the powder dissolved in a little water. Very sick birds should be killed, as it is a waste of time to treat them. Mash may be added to the diet when the birds are obviously on the mend. The value of this treatment, however, is somewhat doubtful, and it should be undertaken only if the extra expense involved is low.

Prevention.

Since the cause is unknown, definite preventive measures cannot be prescribed. As the food may in some way be connected with the disease, a new supply of food should be obtained at once. The old food can be fed later to a few fowls, and, if it is harmless, it can be fed again to the others. Keeping fowls free of worms, lice, etc., on the intensive system will probably help to some extent. All suspected outbreaks of visceral gout should immediately be reported to the Director of Veterinary Services, P.O. Onderstepoort, Pretoria.

The Dairy Industry :

[Continued from page 448.]

Before all possibility of the spread of disease is removed, dairy products cannot be expected to assume their rightful place in the diet of the population. The correct way of tackling the problem is to enlist the co-operation of all concerned in the industry.

Since dairy products are unrivalled as regards taste, flavour and nutritional value, it is our duty to supply the consumer with a product of good quality.

The consumer wants a product of only the very best quality, but unfortunately does not always succeed in obtaining it. If farmers and manufacturers co-operate, they can offer a product of better quality through the application of better manufacturing methods and by means of more effective storing and distribution.

The production of a first-grade product instead of a third-grade product requires little, if any, additional expenses.

The B.W.D. Testing Scheme in the Union.

A. S. Canham, Allerton Laboratory, Division of Veterinary Services.

THIS scheme was introduced in 1939 and at the present time has reached considerable proportions. The number of tests has risen from 60,000 in 1940 to 266,000 in 1945.

As a result of experience gained during this period, it is considered that certain important points should be brought to the notice of all poultry farmers.

That the scheme has been a success is shown by the fact that 110 poultry farmers hold the Government B.W.D.-Free Certificate, and almost as many more are on the present active testing list. In 1939, any poultryman who applied for the test, signed the usual agreement form, and testing was commenced. It was then discovered that in a number of cases, where several rounds of testing had been completed, the number of positive reactors still remained high. Investigation revealed the fact that in many of these cases the hygiene on the farm was bad, the housing was primitive and the earth runs were probably saturated with the organisms causing fowl typhoid and bacillary white diarrhoea. Some farmers neglected to destroy all reactors, as these birds were considered good birds and appeared to be in perfect health. In other cases the wrong birds were killed and, as a result of all these factors, fresh infections occurred between each round of testing.

The position at present is that, if a poultryman desires his flock to be tested, he has to make direct application to his local Government Veterinary Officer and not to the Allerton Laboratory. His farm is visited and inspected, and the poultry plant is either recommended or condemned in so far as suitability for testing is concerned. The report is then sent to Allerton Laboratory, and the agreement form is dispatched from there for the poultryman's signature. It is invariably stressed, in a covering letter, that all birds of four months of age and over must be leg-banded, with differently numbered, sealed, metal rings, which may be bought from the Secretary of the South African Poultry Association. Only when the Laboratory is satisfied that all birds are leg-banded in this manner are blood tubes sent out to the farmer. Unnumbered, coloured, removable leg-bands are not accepted.

If, at the first round of testing all birds over four months old, no reactors are found, the birds under four months are tested when they reach the proper age. If the young birds are also clean, a B.W.D.-Free Certificate is issued. If reactors are found, two complete consecutive clean monthly tests of all birds must first be obtained, the chickens as usual being tested when they are big enough at the age of 3 to 4 months.

No trial testing of portions of a flock, such as the breeding birds only, is undertaken.

Complaints are sometimes made in regard to the non-receipt of tubes for the collection of blood samples. This is largely the fault of the poultryman himself. Many farmers apply for tests during January, February, March and April, which are the heavy testing months of the year. If applications were made in August, the tests

could be commenced in September, and by December or January many flocks could have been cleared up. From December onwards, orders for tubes are dealt with in strict rotation and this procedure will not be departed from *in spite of urgent letters, telegrams and telephone calls*. The wise poultryman will start in September to make arrangements with his Veterinary Officer, the Allerton Laboratory and the South African Poultry Association, for leg-bands.

For technical reasons no tests are carried out on a Saturday morning if blood samples should arrive on that day. If they do, they are placed in the refrigerator until the following Monday and, if still suitable for testing, the test is carried out.

Complaints are occasionally made about samples being returned as useless. In most cases this is because the samples are decomposed. There are several methods by which decomposition can be obviated:

(a) Careful attention should be paid to cleanliness in bleeding the fowls.

(b) Once the blood clot has separated from the serum in the tube, the clot should be removed.

(c) Great care should be taken to see that there is a preservative in all tubes before bleeding commences. In all boxes extra bottles of preservative are included, and, if these are not enough, the solution, which consists of 2.5 per cent. boracic acid, can easily and cheaply be obtained from any chemist. Use five drops for each tube. Owing to prevailing conditions, rubber stoppers for the blood tubes are unprocurable and ordinary cork stoppers must be utilized. As a result of this, leakage of the preservative frequently takes place.

A poultryman, with a large flock of birds to be tested, should commence testing in September so that if infection is only light, the flock will probably be cleaned up in a few months' time. If a very heavy infection is present, he should do four rounds during one season, and then make a determined effort early the following year to clear the flock, as by that time the infection will have been considerably reduced.

Poultrymen who hold the Government B.W.D.-Free Certificate are advised, when advertising their birds for sale, to state specifically in their advertisement: "Holder of Government B.W.D.-Free Certificate". This is to counter such statements as: "B.W.D.-free stock", "Progeny of B.W.D.-free stock", "Blood-tested stock", etc., that frequently appear in advertisements inserted by poultrymen whose fowls have never been tested, or are being tested but are not free from the disease.

Diagnosis of Fowl Diseases.

J. D. W. A. Coles, Research Officer, Onderstepoort.

DURING the past few years farmers have sent fowls in ever-increasing numbers to the laboratories of the Division of Veterinary Services at Onderstepoort, and also at Allerton, Pietermaritzburg, for examination and advice. However, in spite of repeated publication of full directions for despatch, etc., the circumstances in which fowls are sent do not allow the greatest benefit to be derived from the examination.

Some farmers omit to write a covering letter, and frequently leave it to officials to guess their names. Others merely send a couple of lines notifying the Department that some fowls have been sent, and the examining officers are left to imagine all the interesting details that the farmer could have furnished. Then there is the person who sends big live chickens a long distance in a shoe-box without food or water, and such unintentional cruelty is not pleasant to encounter.

Fortunately, the examination of poultry in the Government laboratories has not yet descended to a mere matter of routine. The officials concerned endeavour to make every case an interesting one, and so satisfy their own intellects as well as the farmer's. This desirable state of affairs is possible only with the whole-hearted support of each individual farmer, and the following remarks indicate how this collaboration can be achieved.

Live Sick Fowls better for Examination.

Experience has shown that live sick fowls are more satisfactory for examination than dead ones. However, the expense of railage used to be a formidable obstacle, so regulations have been approved which permit crates of live sick fowls being sent carriage forward, while dead fowls must still be sent carriage paid. It matters little if one or two die on the journey, for they usually arrive in a satisfactory condition for examination.

The fowls must be sent in fairly substantial crates containing food and water receptacles that cannot be overturned. If the journey to be travelled is a long one, a bag of food should be tied on the outside of the crate so that railway officials can feed the fowls *en route*. The Department cannot undertake to return crates or poultry owing to the danger of spreading infectious diseases. The best way to send a dead fowl is merely to wrap it in a piece of hessian. Preservatives should on no account be used, as they interfere with the examination. There is no reason, however, why formalin or some other repellent should not be sprinkled over the fowl, to keep off flies. Day-old chicks can be sent in the ordinary ventilated boxes without food or water. Poultry, dead or alive, should be sent to the Onderstepoort Laboratories, Pretoria North Station, or to Allerton Laboratory, Victoria Station, Pietermaritzburg.

A Fully Descriptive Letter Necessary.

Having despatched the birds, the farmer should write a fully descriptive letter stating, *inter alia*—

- (1) the number of chicks as well as adult poultry kept;
- (2) the number of deaths, and at what intervals they have occurred;
- (3) the various species of poultry kept;
- (4) the housing conditions;
- (5) what the diet consisted of—please do not presume that the officials know the composition of every mash which the farmer may feel inclined to mention only by name, but give the formula, stating how much of each ingredient is incorporated;
- (6) the temperature records of the incubator as well as of the brooder house;
- (7) the amount of floor space (in square feet) allowed for each bird;
- (8) details regarding the egg production;
- (9) the incidence of tampons, fleas, lice, worms and the little black flies that get between the feathers under the abdomen and suck blood;
- (10) the symptoms; (The thermometer should be inserted in the vent. Do not try to interpret symptoms. E.g., instead of saying that the fowl had diarrhoea, say the droppings were very watery and yellowish green, and smelt badly; instead of saying the fowl was blind, say the lids were stuck together over the eye, or that over a period of months the reddish-brown part of the eye had gradually turned grey till the fowl could no longer see out of that eye. A simple, straightforward account of the symptoms does not include a farmer's thoughts and deductions, but only a plain description of what he has ascertained by using only his eyes, nose, ears and hands.)
- (11) the post-mortem appearances of fowls the farmer has opened; (Describe carefully all deviations from the normal.)
- (12) the previous history of poultry disease on the farm, and also details regarding any inoculations.

If letters with full information are written and fowls are forwarded in the manner described, a diagnosis satisfactory to both the farmer and the examiner will be possible, and then only can the best available advice be given.

Replies are usually ready within a week, but in exceptional cases a diagnosis cannot be given with certainty in less than a fortnight in view of essential tests, etc., that have to be carried out.

The Farm Home.

(A Section devoted mainly to the interests of Farm Women.)

Eggs in the Diet.

Miss P. J. Hattingh, Home Economics Officer, Grootfontein
College of Agriculture, Middelburg, Cape.

NEXT to meat, bread and milk, eggs are probably the most frequently used foodstuff in the diet, since they have a very high nutritive value.

The white of an egg contains 86.2 per cent. water, 12.3 per cent. proteins, 0.6 per cent. minerals and 0.2 per cent. fat, and the yolk contains 49.5 per cent. water, 15.7 per cent. proteins, 1 per cent. minerals and 33.3 per cent. fat.

It will be noticed that after water, proteins are the main constituent of eggs. The proteins in eggs are more easily digested than those contained in meat. These proteins build up the body tissues and are therefore very valuable in the diet of growing children or sick people. Egg proteins coagulate when heated and this is the reason why they thicken and bind mixtures such as custard. For this reason, too, anything fried in deep fat is first dipped in an egg mixture. By coagulating, the egg prevents the penetration of too much fat and therefore forms a good crust.

Preparing Eggs.

One egg is sufficient to set one cup of milk. An acid or an acid food such as tomatoes or fruit, causes an egg mixture to coagulate more quickly and more firmly. If egg dishes are prepared in an oven with a high temperature, the dish will be done on the outside but raw on the inside, since eggs coagulate very quickly on the outside. For this reason it is better to place the mixture in a dish with hot water in order that the temperature may be kept at boiling point and an even texture ensured.

When the white of an egg is beaten, the protein in the egg facilitates the incorporation of a large quantity of air. The greater the quantity and the lower the temperature of the air incorporated in this way, the more it expands with heating and the lighter the mixture will be. It is therefore better to beat eggs in a cool place. The addition of salt or cream of tartar will facilitate beating. Beat just before use and fold in with a spatula so as to retain as much air as possible. Heat the mixture immediately; this will prevent the air from escaping since the proteins will coagulate the cell walls. This method is particularly suitable for soufflés, meringues and puff omelette. If the white is beaten until too dry, the cell walls break and the air escapes. The white coagulates easily if mixed with a hot mixture, and for this reason a small quantity of the hot mixture should be added to the beaten white first so that the heating will be gradual. The best procedure is to allow the mixture to cool off a little before adding it to the egg whites.

When boiling eggs, we must remember that the white coagulates at 150° F.; when over heated, eggs become tough and leathery

and are consequently indigestible. Hence, an egg cooked at boiling point is not as digestible as one prepared below boiling point. The best way to boil an egg is to put it in cold water and to remove it just before the water boils.

The fat constituent of eggs is found mainly in the yolk. This fat occurs in the form of a fine emulsion and is very easily digested. In the preparation of mayonnaise, for example, the yolk helps to emulsify the oils if care is taken when mixing, i.e. it helps to keep the oil particles finely divided so that they do not merge and separate from the rest of the mixture.

The yolk of an egg is a rich source of iron and this iron is easily assimilated by the body and used for building up the blood. The yolk also contains sulphur and phosphorus which help to form the bones.

Eggs are an excellent source of vitamin A and also contain vitamin B and D. Most of these vitamins are contained in the yolk. These vitamins are protective substances which protect the body against disease. Vitamin A, for example, strengthens the resistance of the body to disease and promotes growth in children.

Egg Dishes.

Eggs are easy to prepare and may be used in numerous interesting dishes which will lend variety to the diet.

A soufflé made from egg and tomato is well worth trying. Melt 2 tablespoons of fat, add 2 tablespoons of standard meal and mix well. Slowly add $\frac{1}{2}$ cup of milk and 1 cup of tomato pulp, stirring continuously, and allow to boil for 2 minutes. Add $\frac{1}{2}$ teaspoon salt, pepper and $\frac{1}{2}$ cup of cooked macaroni or cooked mashed potatoes. Beat 3 egg yolks well and add them to the mixture. Lightly fold in the stiffly beaten white of the eggs. Pour the mixture into a greased dish and bake in a moderate oven until set. If cheese is obtainable, add $\frac{3}{4}$ cup of grated cheese before the soufflé is placed in the oven. This dish can take the place of meat in a light meal.

Curried eggs are also a very popular supper dish. Melt 2 tablespoons of fat in a pan. Fry 1 finely chopped onion in this until brown. Mix 1 dessertspoon of curry, 1 tablespoon of maize flour, 1 tablespoon of sugar and a teaspoon of salt. Add 1 tablespoon of vinegar and 1 cup of meat extract or vegetable water. Now add the mixture to the onions and stir until thick. Add another cup of meat extract or vegetable water and boil slowly for 15 minutes. Place 6 hard-boiled eggs cut into halves or quarters on cooked rice or potatoes and pour the sauce over them.

A very nourishing omelette can be made as follows: Boil 3 potatoes until soft. Allow to cool and cube 1 cupful. Melt 1 dessertspoon of fat in a pan and fry the potato cubes in this, sprinkling with salt and pepper and a little onion juice. Beat 3 eggs with $\frac{1}{2}$ cup of milk, salt and pepper and pour into a pan in which 2 tablespoons of fat have been melted. While cooking, the mixture should be lifted with a fork to enable all the egg to come into contact with the pan. When half done, add the potatoes, 1 tablespoon cooked, finely chopped, onions and 1 tablespoon chopped

parsley to the mixture. When set, place the mixture in an oven for a few minutes so that a light brown layer can be formed on top. Now sprinkle 3 tablespoons of cheese over the omelette, fold it in half and serve immediately on a hot dish. Slices of fried tomato or pineapple add to the flavour.

Egg and peanut salad will provide a pleasant variation. Halve 6 hard boiled eggs lengthwise. Remove the yolk, mash it and mix with ground peanuts or peanut butter and salad dressing. Stuff the white of the eggs with this mixture. Place 2 halves on a plate and surround with salad. Pour one tablespoon of salad dressing over each egg and garnish with peanuts and parsley.

A quick salad dressing can be prepared by placing 2 mashed egg yolks, 2 tablespoons fat or butter and 1 tablespoon lemon juice in a double boiler. Place over boiling water and beat until the butter or fat has melted. When the mixture thickens, add $\frac{1}{2}$ cup of boiling water and stir well. Add salt and pepper and when thick, remove from the fire and serve with salad, vegetables or meat.

Egg Desserts.

For a light, nourishing dessert, the following baked fruit custard is delicious. Mix 2 cups of milk, 2 eggs, $\frac{1}{4}$ cup of sugar and 1 cup of minced, dried fruit such as raisins or dates. Flavour with vanilla and pour into a greased dish. Bake in a moderate oven in a pan with water.

Another popular dessert can be made by melting 3 tablespoons of fat and adding $\frac{1}{4}$ cup of standard meal. Slowly add 1 cup of hot milk and stir well. Allow to boil. Add 1 tablespoon lemon juice and 1 teaspoon grated orange rind to 4 egg yolks and beat until light and thick. Add $\frac{1}{4}$ cup of sugar and beat again. Now combine the two mixtures and fold in the stiffly beaten white of the eggs. Pour into a mould and steam for 35 minutes. Serve with an orange sauce made by beating 3 egg whites until stiff, slowly add 1 cup of castor sugar, the juice of 2 oranges and 1 lemon, and beat again.

Particularly to-day with the acute meal shortage, eggs can be put to excellent use in desserts and nourishing supper dishes.

HINTS FOR HOUSEWIVES.

Piano Keys:

Damp a soft cloth with alcohol and wipe the keys along the grain. Dry with a soft linen cloth. If the keys have become yellow, rub them gently with fine sandpaper, or cover them with a thick paste made of lemon juice and whiting. The paste should be left on for a few minutes, and then washed off with a soft cloth, wrung out of warm water. Polish with a little sweet oil applied with a soft duster, and rub until all trace of oil has disappeared.

Tea Leaves:

Tea leaves can be put to various uses in the house. They can be sprinkled over carpets and so help to collect and fix dust. If tea leaves which have been kept for several days are infused with boiling water and then strained, they make a useful polish for mirrors, windows, glasses, varnished wood and furniture. Boiled up in a fish pan, tea leaves will also remove the smell.

Information on Departmental Publications.

Farming in South Africa, the monthly journal of the Department, contains popular as well as scientific articles on a variety of agricultural topics, useful to both the farmer and the housewife, while the Crops and Markets Section supplies information on crop prospects, market prices and exports of agricultural produce.

The following particulars in regard to subscriptions and advertisements should be noted:—

Subscription.—Within the Union, South West Africa, Bechuanaland Protectorate, Southern Rhodesia, Swaziland, Basutoland, Mocambique, Angola, Belgian Congo, and British Territories in Africa, 5s. (otherwise 7s. 6d.) per annum, post free, payable in advance.

Applications, with subscriptions, to be sent to the Government Printer, Bosman Street, Pretoria.

Advertisements.—*The Tariff for Classified Advertisements is: 2d. (two pence) a word with a minimum of 5s. per advertisement (prepaid). Repeats, not entailing any change in the wording, will be published at half the cost of the original.*

Conditions:

- (1) The advertisement will be classified under specific headings, and only one black letter (initial letter) is permitted.
- (2) Advertisements in which prices are mentioned must contain the name and address of the advertiser. A nom-de-plume or box number only is not sufficient, and unless this condition is strictly observed, advertisements will not be accepted.
- (3) Advertisements will be classified strictly in accordance with the subject-matter of the announcement, determined by the first item mentioned and cannot be inserted under irrelevant headings.
- (4) Displayed, classified advertisements will also be accepted. The charge, however, will be 10s. per inch, single column, per insertion, without reduction for repeats.

Copy for Advertisements to be in the hands of the Government Printer, Pretoria, not later than the 20th of the month preceding publication.

Send all advertisements direct to the Government Printer, or write to him for details as to tariff for advertisements.

Popular Bulletins.—Bulletins on various agricultural topics are published by the Department to meet public demand. A list of available bulletins giving particulars of cost, etc., is obtainable free of charge from the Editor, Department of Agriculture, Pretoria.

Scientific Publications.—From time to time the different Divisions of the Department issue science bulletins incorporating the results of research work conducted by them. Other scientific publications issued are: "The Onderstepoort Journal", "Memoirs of the Botanical Survey of South Africa", "Bothalia", "Entomological Memoirs" and the "Annual Reports of the Low Temperature Research Institute". Information in regard to these publications is obtainable from the Editor, Department of Agriculture, Pretoria.

Press Service.—The Press of South Africa is now supplied with a bulletin of agricultural information for their exclusive use. This information is supplied to all newspapers and other journals throughout the country.

Farmer's Radio Service.—In addition to the printed information supplied by the Department to members of the farming community, the Department, in collaboration with the South African Broadcasting Corporation, also has a national broadcasting service for farmers. Information in regard to times of broadcasting is contained in the programmes issued by the Broadcasting Corporation.

Inquiries.—All general inquiries in regard to the above should be addressed to the Editor, Department of Agriculture, Pretoria.

D. J. SEYMORE, Editor.

Crops and Markets

A Statistical and Economic Review of South African Agriculture

by

The Division of Economics and Markets

Volume 25

JULY 1946

No. 287

CONTENTS

	PAGE
Price Review for May 1946	493
Index of Prices of Agricultural and Pastoral Products	494
Agricultural Conditions in the Union during May 1946	495
The Onion Position	495
April Estimate of expected Summer Crops, 1945-46 Season	497
Maize Crop Estimate, 1945-46 Season	497
Groundnut Crop Estimate, 1945-46 Season	497
Price Tables and Index	498

Price Review for May 1946.*

Deciduous Fruit.—On all markets grape and pear consignments decreased considerably. Grapes were readily bought at the maximum controlled prices. Pears sold well at high prices. In comparison with prices during the previous month, the price of pears in bushel boxes on the Johannesburg market increased from 15s. 3d. to 17s. 10d. Apple supplies increased somewhat and the demand was keen and high prices ruled. On the Cape Town market Ohenimuri apples increased from 13s. 4d. per bushel box in April to 16s. 2d. per bushel box in May, and White Winter Pearmain from 14s. 3d. per bushel box to 20s. 4d. per bushel box. On the Johannesburg market the same varieties showed the following increases, namely, from 13s. 1d. to 19s. 8d., and from 13s. 2d. to 20s. 3d.

Tropical Fruit.—Papaws and pineapples were more plentiful, and prices consequently decreased gradually. On the Johannesburg market the prices of papaws decreased from 5s. 6d. per standard box in April to 4s. 9d. per standard box in May; on the Port Elizabeth market from 6s. 3d. to 4s. 7d.; and on the Bloemfontein market from 4s. 6d. to 4s. 2d. The following decreases in the prices of pineapples occurred:—on the Cape Town market from 11s. 8d. per box in April to 7s. 6d. per box in May; on the Port Elizabeth market from 9s. 5d. to 8s. 3d.; and on the Bloemfontein market from 9s. 4d. to 8s. 7d. The markets were well supplied with avocados, but bananas and grenadillas were scarce and dear.

Citrus Fruit.—Orange supplies showed a large increase, especially towards the end of the month, and buyers were active. Supplies were sold at the maximum controlled prices. Lemons and naartjies

* All prices mentioned are averages.

were offered in limited quantities. Grapefruit, which was especially plentiful towards the end of the month, received little attention.

Tomatoes.—The markets were well supplied with tomatoes. Many consignments were green and of inferior quality. The demand was good and high prices were realized for good quality.

Potatoes.—In comparison with the previous month, larger supplies of potatoes were available on most markets. On the East London market, notwithstanding larger supplies, there was still a continual shortage of potatoes. Although the quality of potatoes was better, a large portion of the consignments consisted of third-grade potatoes.

Onions and Sweet Potatoes.—Good supplies of onions were marketed, and the best quality dry consignments realized good prices. Adequate consignments of sweet potatoes were offered, and prices were maintained at the level of the previous month.

Vegetables.—Cabbages were offered in large quantities and prices decreased considerably, namely, on the Durban market from 9s. per bag in April to 7s. 7d. per bag in May; on the Cape Town market from 5s. 8d. to 3s. 4d.; and on the Johannesburg market from 9s. 10d. to 8s. 4d. Cauliflower consignments were fair, and prices decreased considerably, especially on the following markets:—on the Cape Town market from 15s. 4d. per bag in April to 5s. 3d. per bag in May; and on the Durban market from 12s. 4d. to 3s. 11d. Carrots, beetroot, turnips and marrows were offered in large supplies and the demand and prices weakened gradually. Fair supplies of beans reached the markets and were sold at lower prices than those of the previous month, namely, on the Durban market from 3s. 1d. per pocket in April to 2s. 4d. per pocket in May; on the Cape Town market from 3s. 4d. to 3s.; and on the Johannesburg market from 2s. 7d. to 1s. 9d. Green-pea consignments decreased and prices increased.

Fodder.—The Johannesburg market was well supplied with teff grass. Lucerne was offered in limited quantities and usually realized the controlled price. Fair quantities of chaff and sweet grass sold well. Green lucerne and green barley realized good prices. Oats are practically unobtainable.

Poultry and Poultry Products.—Limited quantities of eggs reached the markets. On the Johannesburg market fowls were fairly plentiful, while reasonable numbers of ducks and turkeys were also offered. On the other markets poultry consignments were small.

Index of Prices of Agricultural and Pastoral Products.

THIS index (see table elsewhere in this issue) increased from 174 in April to 184 in May. This considerable increase is due to the fact that the producer's prices of maize have been increased as from 1 May 1946, and also because kaffircorn prices rose particularly high since the control measures, as announced in the June issue of *Crops and Markets*, were abolished.

The index for "Hay" decreased from 176 in April to 170 in May as a result of the decrease in the prices of lucerne and teff hay.

The index for "Other Field Crops" decreased from 299 in April to 286 in May as a result of the decreases in the market price of potatoes, sweet potatoes and dry beans.

The index for "Pastoral Products" increased slightly from 118 in April to 119 in May as a result of the increase in the price of mohair.

As a result of the seasonal decrease in the prices of cattle, viz., from 168 in April to 165 in May, the index for "Slaughter Stock" showed a further decrease in comparison with the previous month.

The index for "Poultry and Poultry Products" increased from 320 in April to 332 in May as a result of the increases in the prices of eggs, fowls and turkeys.

Agricultural Conditions in the Union during May 1946.

Rainfall.—Scattered showers occurred in the western Cape Province, south-western and north-western Cape, as well as in the Karoo. The Transkei, Natal and the north-western Orange Free State also experienced scattered showers. In some areas, however, rain is still urgently needed.

Pastures.—In the north-western Cape Province, the Karoo and Border area the pasture is still fair, except in certain districts where it is scarce and dry. As a result of scattered showers the pasture in the remainder of the Union is still satisfactory.

Stock.—The condition of stock in the Cape Province is generally good. *Lumpy skin disease* still occurred in the north-western Cape, and *scab* disease was also fairly prevalent. In the Border area there were cases of horse- and gallsickness. In Natal *nagana* still caused considerable losses among stock. The condition of stock in the Transvaal is still good. *Lumpy skin disease* occurred in the eastern Highveld and in the northern areas, and is also now beginning to make an appearance in the Lowveld region. In the Orange Free State the condition of stock is fair, but *lumpy skin disease* still occurs in all parts.

Crops.—In the north-western Cape Province the winter crops are generally promising, although more rain is necessary to help the young crops through the winter. Pea and bean crops are also promising. It is expected that the native production of maize and kaffircorn in the Border area will be better than the yields of the two past seasons. Good maize crops are also expected in the Transkei and the native production will also be considerably above that of the two past seasons.

As a result of the drought, crops in Natal, especially in Zululand, will be below normal. Summer and winter cereals in the Transvaal are promising and reasonable crops are expected. In the Orange Free State, since the frosts were late, summer cereals, especially late maize, were still able to ripen and reasonable crops are expected.

As a result of the favourable weather conditions, the farmers were able to sow wheat extensively and the young wheat is very promising.

The Onion Position.

ACCORDING to reports received from the principal onion-producing areas of the Western Province it appears that this year's crop is the heaviest yet obtained. In all the areas there has this year been an increase which varies from 20 per cent. to 40 per cent. in comparison with last year's crop.

On the whole, the quality this year is considerably better. Almost everywhere onions were very healthy and ripened well. During the crop period farmers had very favourable weather so that the crop was stored in an excellent condition.

In the Vyeboom area the crop was slightly later than usual owing to late planting, consequently, a few loose onions are still available which by this time in other years would already have been marketed.

In comparison with last year, the increases in the different areas are estimated as follows:—

Tulbagh and Ceres.....	30 per cent.
Worcester.....	20 per cent.
Villiersdorp.....	20 per cent.
Vyeboom.....	20 per cent.
Elgin.....	20 per cent.
Botrivier.....	25 per cent.
Caledon.....	25 per cent.
Diepgat.....	20 per cent.
Stanford and Bredasdorp.....	25 per cent.
Riviersonder-end.....	30 per cent.
Greyton and Middelplaas.....	40 per cent.
Langkloof.....	50 per cent.

The present prices on the local markets still compare very favourably with those of last year. The fact, however, is that thus far only the relatively small quantities of loose onions have been marketed. Loose onions were scarce because the crop was of such good quality.

Last year's crop, i.e., the 1944-45 crop, was estimated to be about 10 per cent. greater than that of the previous season. As the last census survey of onions was taken in 1936-37, an estimate of last year's actual production could only be made on a percentage estimate. The Cape crop was then estimated as follows:—

Reaped 1943-44 (Bags 120 lb.) 77,623	Expected Crop 1944-45 Bags 120 lb.) 83,982
---	---

Whereas the Cape crop is thus about 20 per cent. higher this year than that of last year, the number of bags of 120 lb. is estimated to be at least 100,000. According to the 1936-37 census the number of bags for the Cape Province was more than 209,000, so that this year's crop is about 50 per cent. less than that of 1936-37. According to the abovementioned census, the Cape production was then about 77 per cent. of the total of the Union, Transvaal production about 16 per cent., and that of the Orange Free State about 7 per cent. These proportions are probably still approximately the same this year.

For the week ended 23 May 1946 prices on the eight most important markets were as follows:—

	Lowest Price.	Highest Price.	Average Price.
	s. d.	s. d.	s. d.
Cape Town.....	3 0	16 0	12 7
Johannesburg.....	8 0	15 0	12 5
Durban.....	5 0	24 0	15 8
Bloemfontein.....	5 0	25 0	11 11
East London.....	10 0	17 6	14 0
Pietermaritzburg.....	10 0	16 9	13 2
Port Elizabeth.....	7 6	14 0	10 2
Pretoria.....	5 6	17 0	13 11

Although there is a considerable difference between the lowest and the highest prices of the various cities, it will be noticed that the average prices do not differ much, except in the case of Durban where the offerings were below normal.

April Estimate of expected Summer Crops, 1945/46 Season.

	Average production, 1936-45.	Final estimated production, 1944-45.	Estimated production, April, 1946.
Kaffircorn (bags 200 lb.) :— (Europeans only)—			
Cape Province.....	112,000	135,000	135,000
Natal.....	47,000	28,000	20,000
Transvaal.....	488,000	266,000	564,000
Orange Free State.....	118,000	130,000	59,000
UNION.....	765,000	559,000	778,000
Potatoes (bags, 150 lb.) :—			
Cape Province.....	727,000	900,000	727,000
Natal.....	247,000	246,000	213,000
Transvaal.....	1,025,000	883,000	1,519,000
Orange Free State.....	530,000	432,000	452,000
UNION.....	2,529,000	2,461,000	2,911,000

Maize Crop Estimate, 1945/46 Season.

Particulars for the different areas are as follows:—

	Average production (9 years) 1936/37- 1944/45.	Final estimate, 1944-45.	Estimate April, 1946.
	(bags, 200 lb.)	(bags, 200 lb.)	(bags, 200 lb.)
Cape Province.....	2,470,000	1,410,000	2,510,000
Natal.....	2,100,000	2,010,000	2,080,000
Transvaal.....	9,043,000	6,630,000	8,410,000
Orange Free State.....	8,488,000	8,340,000	5,750,000
UNION.....	22,101,000	18,390,000	18,750,000

Groundnut Crop Estimate, 1945/46 Season.

THE Division of Economics and Markets is now in a position to announce that, according to reports received from crop correspondents and other sources towards the end of May, it is estimated that the present commercial groundnut crop will be approximately 240,000 bags (of 100 lb. unshelled).

Attention is drawn to the fact that, apart from the Springbok Flats where approximately 85 per cent. of the Union crop is produced, there has also been an increased production in the Waschbank area in the Dundee district of Natal.

During the present season groundnuts are even being produced in the northern Orange Free State in the vicinity of Parys and Vredefort, where there has been no production in the past. In the Vaalhartz area a small quantity is also being produced.

Average Prices of Eggs and Poultry on Municipal Markets.

SEASON (1 July to 30 June).	EGGS.			FOWLS (Live, each).			TURKEY COCKS (Live, each).		
	Johannes- burg, New- laid. Per Dozen.	Durban, New- laid. Per Dozen.	Cape Town. Per 100.	Johannes- burg.	Durban.	Cape Town.	Johannes- burg.	Durban.	Cape Town.
1938-39.....	s. d. 1 0	s. d. 1 1	s. d. 7 11	s. d. 2 6	s. d. 2 4	s. d. 2 7	s. d. 10 7	s. d. 12 7	s. d. 10 3
1939-40.....	0 11	1 3	7 4	2 6	2 5	2 5	10 2	12 5	9 3
1940-41.....	1 1	1 3	8 3	2 11	2 10	3 0	8 5	12 0	9 8
1941-42.....	1 6	1 9	10 7	3 5	3 4	3 7	12 10	16 2	14 4
1942-43.....	1 10	2 0	13 5	4 6	4 2	4 8	16 3	16 10	15 0
1943-44.....	2 1	2 2	14 2	5 3	5 3	5 6	16 7	20 6	15 8
1944-45.....	1 11	—	14 10	5 1	5 6	5 9	16 8	18 5	18 7
1945—									
January.....	2 3	2 2	17 10	4 5	5 2	5 6	12 8*	17 8	17 0
February.....	2 6	2 6	19 10	4 7	5 5	5 6	12 0	21 2	15 11
March.....	2 9	2 10	20 5	4 8	5 6	5 7	12 9	12 4	15 6
April.....	3 2	3 2	22 7	5 1	5 10	5 5	13 0	13 1	15 1
May.....	3 3	3 8†	26 0	5 4	4 11	5 4	13 10	14 9	15 1
June.....	3 2	3 5	25 11	5 11	6 1	5 11	13 0	16 7	21 1
July.....	1 10†	2 0	16 5	0 4	6 6	6 2	17 5	15 10	19 5
August.....	1 7	1 6	11 11	0 1	6 8	6 0	18 4	18 9	22 2
September.....	1 5	1 5	11 0	5 6	6 3	6 1	17 10	19 7	24 8
October.....	1 6	1 7	10 11	4 8	5 11	5 8	17 3	20 5	13 8
November.....	1 7	1 8	11 7	4 4	5 5	5 7	15 6	20 1	23 6
December.....	2 0	2 2	14 1	4 5	5 4	5 5	14 0	17 7	—
1946—									
January.....	2 4	2 7	13 3	4 6	5 5	5 6	14 1	14 8	—
February.....	2 8	2 10	20 11	4 3	5 5	5 4	12 0	15 10	—
March.....	3 0	3 2	21 6	4 7	5 9	5 8	12 4	14 3	—
April.....	3 6	3 9	27 2	5 1	5 7	5 6	12 5	12 9	—
May.....	3 6	3 10	28 6	5 8	5 9	5 3	13 9	18 0	—

* Prices of Turkeys: Live, each.

† Large, Grade I.

Average Prices of Green Beans, Green Peas and Carrots on Municipal Markets.

SEASON (1 July to 30 June.)	GREEN BEANS (Pocket 20 lb.).			GREEN PEAS (Pocket 20 lb.).			CARROTS (Bag). (a).		
	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.
1938-39.....	s. d. 1 8	s. d. 2 3	s. d. 2 0	s. d. 2 4	s. d. 1 9	s. d. 1 2	s. d. 3 8	s. d. 2 6	s. d. 6 1
1940-41.....	1 11	2 9	1 5	2 8	2 4	2 3	5 9	4 11	13 4
1941-42.....	2 7	3 10	2 6	3 11	3 3	3 4	8 5	8 11	17 2
1942-43.....	3 1	4 3	3 0	3 3	2 10	3 9	5 1	8 9	13 2
1943-44.....	3 8	4 11	3 0	4 11	4 10	4 11	9 11	11 1	20 2
1944-45.....	3 7	5 1	4 1	4 9	4 1	5 5	8 3	9 11	19 10
1945—									
January.....	1 10	0 11	2 4	4 3	1 9	6 7	7 7	3 1	10 2
February.....	1 7	3 4	2 3	5 5	6 9	7 4	7 8	6 11	19 1
March.....	2 3	4 11	2 6	7 7	12 0	6 7	9 5	6 3	25 4
April.....	1 11	2 8	1 10	4 4	6 6	4 0	8 6	13 9	19 6
May.....	3 3	5 3	2 3	5 9	9 11	3 1	9 5	3 7	21 6
June.....	4 3	4 2	5 0	4 9	7 9	3 8	10 0	10 10	13 9
July.....	9 10	7 10	5 10	8 2	11 7	5 5	10 1	16 4	20 11
August.....	7 4	6 4	6 10	5 8	7 10	5 5	13 4	17 11	12 11
September.....	3 1	5 9	4 1	2 8	4 1	2 4	7 5	12 8	16 8
October.....	3 8	5 4	4 9	4 4	3 6	7 7	9 6	9 10	20 11
November.....	1 6	3 4	2 4	9 0	4 0	9 4	9 8	8 8	16 4
December.....	2 4	2 3	2 8	12 1	—	12 5	10 9	7 10	13 10
1946—									
January.....	3 4	1 11	5 6	8 8	10 11	14 7	9 8	6 2	16 0
February.....	1 11	—	2 3	6 5	—	6 4	7 3	7 11	14 1
March.....	2 10	1 1	2 5	6 1	—	3 4	8 10	8 1	23 10
April.....	2 7	3 4	3 1	5 7	—	4 10	10 2	9 3	24 2
May.....	1 9	3 0	2 2	7 2	3 10	5 10	7 1	6 3	13 8

(a) Weights of bags vary, but on the average are approximately as follows:—Johannesburg, 130 lb.; Cape Town, 90 lb.; and Durban, 120 lb.

CROPS AND MARKETS.

Index of Prices of Field Crops and Animal Products.

(Basic period 1936-37 to 1938-39=100.)

SEASON (1 July to 30 June).	Summer cereals.	Winter cereals.	Hay.	Other field crops.	Pastoral products	Dairy products.	Slaughter stock.	Poultry and poultry products.	Com- bined index.
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	
WEIGHTS.	19	13	2	3	34	6	17	6	140
1938-39.....	92	107	96	89	79	102	106	99	93
1939-40.....	86	107	77	95	115	105	106	89	103
1940-41.....	109	113	106	156	102	108	110	104	108
1941-42.....	121	134	143	203	102	131	134	145	123
1942-43.....	160	149	144	159	122	147	167	173	146
1943-44.....	169	172	137	212	122	154	182	204	157
1944-45.....	184	183	160	230	122	177	172	187	163
1945—									
January.....	184	183	177	250	122	159	173	206	163
February.....	184	183	171	235	122	180	171	225	164
March.....	184	183	182	245	122	180	171	237	165
April.....	184	183	173	246	122	180	169	263	166
May.....	199	183	173	247	122	184	163	272	170
June.....	199	183	190	320	123	184	170	262	172
July.....	199	183	191	315	118	210	175	210	170
August.....	199	183	191	333	118	210	179	140	169
September.....	199	183	187	372	118	210	183	165	170
October.....	199	183	189	383	118	210	187	165	171
November.....	199	190	194	379	118	204	187	173	172
December.....	199	190	194	341	117	204	183	202	172
1946—									
January.....	199	190	191	349	118	204	179	233	174
February.....	199	190	158	308	118	186	175	256	171
March.....	199	190	160	283	118	186	171	277	171
April.....	199	190	176	299	118	186	168	320	174
May.....	250	190	170	286	119	186	165	332	184

(a) Maize and kaffoorn.
(b) Wheat, oats and rye.
(c) Lucerne and teff hay.

(d) Potatoes, sweet potatoes,
onions and dried beans.
(e) Wool, mohair, hides and skins.

(f) Butterfat, cheese milk and
condensed milk.
(g) Cattle, sheep and pigs.
(h) Fowls, turkeys and eggs.

Average Prices of Cabbages, Cauliflower and Tomatoes on Municipal Markets.

SEASON (1 July to 30 June).	CABBAGES (Bag). (a)			CAULIFLOWER (Bag). (a)			TOMATOES (Trays 15 lb.).			
	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.	Johannesburg.			
							N.M. No. 1	Other.	Cape Town.	Durban.
1938-39.....	s. d. 3 10	s. d. 3 0	s. d. 3 10	s. d. 3 0	s. d. 1 8	s. d. 3 5	s. d. 2 2	s. d. 1 3	s. d. 1 8	s. d. 0 10
1940-41.....	5 10	4 8	7 1	3 11	4 3	5 3	2 7	1 6	2 1	1 2
1941-42.....	8 10	5 5	11 5	5 9	5 7	7 11	3 1	1 9	2 3	1 6
1942-43.....	5 6	5 11	9 1	5 0	5 9	7 6	3 4	1 10	2 1	2 7
1943-44.....	11 1	7 4	17 6	9 2	6 2	12 1	5 5	2 9	3 7	2 0
1944-45.....	9 7	6 11	13 5	7 5	6 6	9 8	4 1	2 0	2 8	1 9
1945—										
January.....	8 0	4 9	15 8	6 3	—	—	6 1	2 6	2 7	2 2
February.....	7 8	8 6	22 4	9 5	6 11	—	3 0	1 2	3 1	1 1
March.....	8 5	10 5	24 1	8 8	—	8 0	3 4	1 5	2 5	2 4
April.....	8 7	7 11	14 8	7 7	9 7	11 4	3 4	1 5	2 6	1 7
May.....	7 6	5 4	11 2	7 3	6 5	10 10	4 0	1 10	2 4	1 10
June.....	8 11	4 3	10 6	11 7	7 7	14 10	3 11	2 1	3 0	1 1
July.....	12 2	5 4	11 0	12 3	5 7	11 0	3 7	1 10	2 9	1 2
August.....	12 0	9 7	8 11	10 0	8 2	12 3	5 2	3 2	3 4	1 5
September.....	12 2	11 7	10 3	11 8	9 6	14 10	6 7	3 1	3 10	1 10
October.....	10 1	12 1	16 3	17 0	5 9	11 0	6 2	2 8	3 1	1 8
November.....	10 9	9 11	16 0	12 9	8 6	—	5 7	2 8	4 0	1 6
December.....	14 2	9 10	17 7	26 0	3 6	—	3 0	1 1	3 11	1 1
1946—										
January.....	9 7	8 0	14 8	14 5	9 0	—	4 3	1 10	2 5	1 3
February.....	7 3	9 1	18 1	10 10	6 6	—	4 2	1 7	1 11	1 3
March.....	8 11	7 3	14 4	7 2	9 8	3 4	6 2	3 8	2 6	1 6
April.....	9 10	5 8	9 0	6 7	15 4	12 4	8 1	3 6	2 8	2 0
May.....	8 4	3 4	7 7	7 2	5 3	8 11	6 3	2 11	3 8	2 3

(a) Weights of bags vary, but on the average are approximately as follows: For cabbages—Johannesburg, 150 lb.; Cape Town, 105 lb., and Durban, 90 lb. For cauliflower—Johannesburg, 100 lb.; Cape Town, 65 lb. and Durban, 85 lb.

Average Prices of Apples, Pears and Grapes on Municipal Markets.

SEASON (1 July to 30 June).	APPLES (Bushel box).						PEARS (Bushel box).		GRAPES (Tray).
	Johannesburg.			Cape Town.			Johannesburg.		Johan- nesburr.
	Oheni- muri.	White Winter Pear- main.	Wem- mers- hoek.	Oheni- muri.	White Winter Pear- main.	Wem- mers- hoek.	N.M. No. 1.	Other.	All kinds.
1938-39.....	s. d. 7 2	s. d. 6 0	s. d. 5 10	s. d. 7 3	s. d. 8 0	s. d. 4 3	s. d. 6 7	s. d. 4 2	s. d. 1 3
1940-41.....	8 4	7 1	6 4	8 11	10 8	5 0	8 11	6 3	1 8
1941-42.....	8 11	7 11	7 3	9 1	10 9	6 9	7 3	8 0	1 11
1942-43.....	14 9	11 6	9 1	10 8	12 11	6 11	—	10 8	1 10
1943-44.....	12 2	11 3	9 11	13 10	11 2	5 10	—	14 11	3 7
1944-45.....	14 9	13 5	11 6	12 0	12 0	8 3	—	13 2	6 10
1945—									
January.....	18 5	14 4	—	16 11	—	—	—	16 5	5 2
February.....	15 6	15 0	8 3	12 10	—	—	—	12 9	2 4
March.....	12 2	12 9	8 1	12 7	16 5	10 3	—	13 3	1 10
April.....	12 2	12 11	14 5	13 7	18 7	8 0	—	11 9	2 5
May.....	15 5	11 6	—	15 1	18 10	9 1	—	11 3	—
June.....	17 6	18 0	13 11	17 2	20 3	—	—	—	—
July.....	19 11	20 9	—	17 9	20 8	—	—	—	—
August.....	22 6	19 4	19 6	20 4	23 0	—	—	—	11 10
September.....	22 2	21 3	—	21 7	21 11	18 10	—	—	8 11
October.....	23 10	25 3	—	21 11	22 1	—	—	—	—
November.....	32 3	24 6	—	27 3	29 10	—	—	9 2	—
December.....	20 0	12 0	—	27 5	27 5	—	—	20 9	7 5
1946—									
January.....	18 8	22 10	—	—	—	—	—	15 9	3 7
February.....	15 6	13 7	12 9	15 5	15 2	5 6	—	13 4	1 5
March.....	12 11	14 4	10 11	12 10	14 1	12 8	—	13 5	3 6
April.....	13 1	13 2	13 5	13 4	14 3	15 2	—	16 3	—
May.....	19 8	20 3	21 3	16 2	20 4	15 2	—	17 10	—

Prices of Avocados and Papaws on Municipal Markets.

SEASON.	AVOCADOS (Per Tray). (a)				PAPAWS. (b)						
	Cape Town.	Durban.	Johannesburg.		Cape Town Std. Box.	Durban. Tray.	Johannesburg.		Port Elizabeth Std. Box.	Bloemfontein Std. Box.	
			Ordinary.	N.M.			Ordinary Std. Box.	N.M. Std. Box.			
1938-39.....	s. d. 1 6	s. d. 0 11	s. d. 1 3	s. d. 1 11	s. d. 2 0	s. d. 0 10	s. d. 1 7	s. d. 2 0	s. d. 2 0	s. d. 1 8	
1939-40.....	2 1	1 2	1 9	2 11	2 3	0 10	1 4	1 9	1 11	1 6	
1940-41.....	1 10	0 10	1 5	2 4	2 1	1 1	1 9	2 2	2 3	1 9	
1941-42.....	2 4	1 7	2 1	3 4	2 5	0 10	1 10	2 1	1 11	2 0	
1942-43.....	3 1	1 8	2 10	4 3	3 2	1 2	2 1	2 7	2 2	2 0	
1943-44.....	4 1	1 6	3 7	5 3	3 2	1 5	2 5	3 5	3 3	2 7	
1944-45.....	—	—	—	—	3 4	1 6	3 1	4 1	3 5	3 0	
1945—											
January.....	3 11	—	4 10	7 2	3 10	1 5	4 1	4 9	6 5	3 6	
February.....	2 0	2 3	2 6	4 3	2 8	1 10	5 11	7 6	—	5 5	
March.....	2 0	0 11	2 3	4 4	4 10	1 10	5 4	6 9	—	4 10	
April.....	1 10	0 10	2 7	3 11	4 9	1 8	4 5	6 2	4 11	4 6	
May.....	2 4	0 9	2 5	4 3	4 7	1 6	3 7	5 0	4 7	2 11	
June.....	2 4	2 5	2 10	6 1	4 4	1 11	3 7	4 6	4 0	3 6	
July.....	3 4	2 4	3 10	5 8	4 2	1 2	4 10	5 9	4 11	5 0	
August.....	6 8	3 10	6 2	7 4	5 10	1 5	4 10	6 1	5 3	5 0	
September.....	5 4	3 1	6 5	7 0	3 3	1 4	3 3	4 1	2 7	3 6	
October.....	7 2	3 8	8 1	7 4	2 7	1 5	2 5	3 5	2 2	2 4	
November.....	9 5	3 6	6 6	8 0	3 6	2 0	2 7	3 7	6 7	3 2	
December.....	7 8	1 0	7 1	—	4 4	1 0	3 11	5 7	5 10	3 6	
1946—											
January.....	8 1	1 8	5 10	9 2	3 10	1 6	4 5	7 11	6 4	3 11	
February.....	3 4	0 10	3 1	5 0	2 10	1 5	7 1	5 6	5 6	4 7	
March.....	2 11	3 7	2 8	4 0	—	1 1	6 6	7 8	6 4	5 8	
April.....	2 8	1 11	3 4	4 9	5 5	1 1	5 6	7 11	6 3	4 6	
May.....	3 0	1 10	3 7	5 5	5 1	1 1	4 9	5 8	4 7	4 2	

(a) Season 1 January to 31 December.

(b) Season 1 April to 31 March.

CONTENTS



	PAGE
EDITORIAL:	
Research Needs in the Soil Conservation Campaign	503
ANIMAL HUSBANDRY:	
Lumpy Skin Disease in Game (Director of Veterinary Services)	502
Prices of Vaccines (Veterinary Services, Onderstepoort) ...	502
Calf Rearing (Drs. J. W. Groenewald and P. J. v. d. H. Schreuder)	511
Black Quarter (Dr. E. M. Robinson)	522
The Preparation of Skins for the Market (II) (P. D. Rose) ...	523
The Density of Milk (S. Bakalor)	531
D.D.T. for the Protection of Sheep against Blowfly (R. du Toit)	542
Heartwater (R. Alexander, W. O. Neitz and T. F. Adelaar) ...	548
VITICULTURE:	
Sunscald in Table Grapes (M. S. le Roux)	506
FIELD HUSBANDRY:	
Oats and Wheat as Grazing for High-Producing Cows (W. A. Verbeek)	545
Hormone Sprays and the Control of Pre-Harvest Drop of Apples (Dr. H. L. Pearce)	553
POULTRY:	
A Laying Battery for Poultry in Towns (G. C. van Drimmelen)	539
GENERAL:	
Nursery Quarantines	502
What we Know about D.D.T. (Dr. B. Smit and B. K. Petty) ...	533
THE FARM HOME:	
Ironing (Miss K. Richter)	561
CROPS AND MARKETS	565

[NOTE.—Articles from *Farming in South Africa* may be published provided acknowledgment of source is given.]

FORD'S FOR SEEDS—A. FORD & Co. (Pty.,) Ltd.
AGRICULTURAL SEEDSMEN.

**SEED CONTRACTORS TO THE UNION GOVERNMENT,
P.O. BOX 5701. CATALOGUES FREE JOHANNESBURG.**

G.P.-S.3824-1946-7-7.500.

Lumpy Skin Disease in Game.

An observant farmer recently sent to Onderstepoort lesions which he discovered on the skin of a duiker he had shot. These lesions very closely resemble those seen on animals suffering from lumpy-skin disease. Unfortunately it was not possible to make absolutely sure because the material was already too old.

If the presence of this disease among game is confirmed, the implications are obvious. An already complicated and difficult problem will become even more so. Not only might game assist in spreading the disease, but there would be a real danger of its becoming enzootic in some suitable species of wild animal. (Such animals are known as carriers.)

For these reasons it would be appreciated by the Veterinary Division if anyone who happens to shoot buck, would make a point of examining the skin for lumps, and, if anything suspicious is found, to forward to Onderstepoort fresh pieces of skin preserved in formalin or, if that is not available, simply packed in dry salt.

(Director of Veterinary Services.)

Prices of Vaccines.

As from 1 August 1946 the prices of the undermentioned vaccines will be altered as follows:—

<i>Vaccines.</i>	<i>Old Prices.</i>	<i>New prices.</i>
Bloedpens	4s. 2d. per 100 doses	5s. 0d. per 100 doses.
Bluetongue	4s. 2d. per 100 doses	5s. 0d. per 100 doses.
Chicken pox	3s. 6d. per 100 doses	2s. 6d. per 100 doses.
Anthrax	2s. 6d. per 100 doses	5s. 0d. per 100 doses.

Fowl pox vaccine will be sold in 100 dose bottles only, i.e., the minimum quantity supplied will be 100 doses.

Bluetongue vaccine will be sold in bottles of 10, 20, 50, 100, and 150 doses, and no longer in bottles of 12 and multiples of 12.

Two types of fowl-pox vaccine will be issued and the strength of vaccine sent will depend on the age of the fowls and turkeys. It is therefore absolutely essential, when ordering, to give the age in weeks of the fowls and turkeys. The old type of weak vaccine (pigeon-pox virus) is for fowls and turkeys up to one month and over three months. The other new type of strong vaccine (chicken-pox virus) is for fowls and turkeys from one to three months old. The price for both types is the same, viz. 2s. 6d. per 100 doses.

(Veterinary Services, Onderstepoort).

Nursery Quarantines.

The following nursery quarantines were in force on 1 July 1946:—

- (1) Dunrobin Nurseries, Bothas Hill, Natal, on poplars (all), for red scale.
- (2) Howden's Westville, Durban, on Eugenias (all), for circular purple scale.

FARMING IN SOUTH ... AFRICA

Vol. 21

AUGUST 1946.

No. 245

Editorial:

Research Needs in the Soil Conservation Campaign.

SINCE the threat of soil erosion and the wastage of natural resources have been demonstrated in films, lectures and in the press, thinking people have come to realize the need for drastic action and have called for and approved a national campaign with the passing of the Soil Conservation Bill.

The form which this campaign will take has also been indicated, and methods of checking erosion and restoring soil health are known to consist of proper veld management, contour farming, afforestation, crop rotations, sound manurial practice, ley and contour strip cropping, flood-water control, the construction of dams and weirs, silt control, the conservative use of underground water and the proper siting of roads and railways.

These are the lines on which we know we have to proceed, but our experience of soil conservation under conditions in the Union is still limited. On veld management, a subject of paramount importance, particularly throughout the drier regions of the country, research has been carried out in certain areas, but in the western Karoo, Orange Free State and Transvaal there are very wide gaps in our knowledge of the problems of veld management, although in these large areas the whole farming system is based on the productivity and well-being of the veld. In these parts the veld is being grossly mismanaged and is generally in a most unsatisfactory condition. To take another example: What do we know about ley rotations for the maize-producing areas? It is certain that, over a large portion of these cropping areas, a perennial ley grass and proper rotations present one of the means for stabilizing the soil. But at present we have not the seed supplies to embark on ley cropping on anything but an insignificant scale. Although seed supplies of Rhodes, Paspalum and rye grasses are obtainable, these grasses are of little use in the drier parts. Suitable heavy-yielding grasses have been found, however, but as yet seed supplies of these are virtually non-existent and commercial production must be started without delay. The large amount of seed needed for the revegetation of denuded veld is similarly not obtainable either in commerce or from departmental sources; but although methods of harvesting and use are still in the experimental stage, rapid advances are now being made. The effectiveness of contour banks, grass contour strips and silt traps depends in large measure on the

rapid revegetation of the disturbed soil with suitable plants, whether grass or soil-binding plants or thorn barriers. Our resources of seed and suitable plant supplies for this are as yet totally inadequate to meet the needs of the soil conservation campaign.

Then there is the wider problem of fitting agricultural practice and soil conservation to the economic needs and financial resources of the country. We have no difficulty in finding examples of successful conservation work in other countries, particularly in America, but America's soil conservation problems are not entirely comparable with our own. Her snow-capped mountains, extensive forests and her climate give her an advantage over our country in respect of agricultural potentialities; she has vast financial resources, large navigable rivers, immensely rich soils and a large European population.

South Africa, on the other hand, is a "younger" country with a small percentage of enlightened population. Conditions of land use have changed more recently, and the millions of tradition-bound illiterate natives who work the land will not make the task of applying suitable methods of conservation to the new conditions any easier, since static land use and intensive farming do not fit in with the natives' traditions.

The initial work on conservation that has been done in the Union has shown great promise; but, because conditions in America are so different from those in the Union, experimental work must be extended to deal with the problems that are peculiar to South Africa. If we follow America too closely, we shall risk over-capitalization and grave loss unnecessarily.

Similarly, it is not wise to build on the knowledge that may be obtained from the East, with its teeming millions of peasants with a low standard of living, often also with abundant energy and high intelligence. If we hope to achieve soil stability by Eastern methods, we are in danger of over-rating the mental capacities and ability for hard and responsible effort of our native peoples, and we would have to assume that an intensive peasant agriculture is possible and desirable in this country.

The fact must be faced that there is no direct precedent, no example which we can unreservedly follow. The problems of soil conservation must be approached from first principles, with initial general guidance from the small amount of local evidence and the work done overseas.

Therefore, a vigorous research service, spread over all the different regions of the country in a network of research stations, is an immediate and vital need for this campaign to save the soil. Method and procedure have been worked out, and work is proceeding under great difficulties on account of the lack of trained staff and the very limited facilities that have been granted.

Research must, however, proceed beyond the mere seeking for remedies for the evils that exist to-day. The country is developing rapidly and the rôle of agriculture will change correspondingly. There must always be a regard not only for the regional problems, but also for the nation's needs as a whole. We know that there is a relationship in each soil between the amount of feedstuffs that can be removed each year, and the replacement needs of the soil—needs which may be met by restoring the organic matter content (either by veld and pasture management or the return of manure and compost), by cultural treatment, or by the application of fertilizers and

the employment of rotations. If but little is removed each year per unit area, the expense and effort on replacement are small; if the removal rate is increased, replacement and production costs rise correspondingly for a time, and then increase disproportionately as the law of diminishing returns operates.

Soil conservation implies that the necessary returns are being made to the soil relative to the degree of removal of produce; it also implies the conservative use of the plants and perennial vegetation. It is often thought that our knowledge of these matters is sufficient, and that with the expenditure of public funds on conservation all will be well, yet every step in the direction of increased production and better nutrition of our people—to say nothing of export—will call for a greater output from the soil, and a greater effort in the direction of fertility maintenance. Experimental evidence is needed on this subject now, for the day when the soil conservation programme strikes these dominant controls.

The subsistence needs of the nation as a whole need to be reviewed, and decisions must be arrived at as to where and how the requirements can be fulfilled. A vegetation map is at present being made of the whole Union, and, coupled with the work outlined above, will be the means of attaining a sound regionalization of farming on ecological lines. The degree of intensification of farming in each area must be determined by the national needs for each particular commodity, and the price in labour and fertility maintenance that we are able to pay for each region. To approach the problem, something in the nature of a Subsistence Unit must be worked out on each station, but this more advanced phase of research can only be effectively carried out when more is known about the basis and implications of soil conservation. Relevant questions are: What is to be the labour and material costs of soil conservation for the scale of production needed by the nation to-day? . . . Should increases in production be achieved by an extension of crops into the marginal areas, or should increased requirements be met by augmenting the yields in the best suited areas? (As a rule, in the marginal areas the cost of fertility maintenance is high.) What degree of urbanization is desirable, and what is the ratio of animal production to purely crop production that can best meet the people's needs? We know that manure and compost are of great importance, but supplies of both depend largely on the balance of animals and crops. There will of necessity always have to be a very extensive amount of cereals and other crops for human consumption.

Research in conservation must therefore start from the appreciation of problems and needs in each region, disperse into specific research projects and experiments, and finally be woven together into a useful interpretation, not only for the station and particular region, but also for the country as a whole, and—so far as imports and exports are concerned—other countries of the world as well.

Soil conservation is not a local problem. The work on stations cannot be local: it must be inter-woven into the framework of regional, national and economic limitations and demands.

Sunscald in Table Grapes.

M. S. le Roux, Viticulturist, Western Province Fruit
Research Station, Stellenbosch.

WINE-GROWERS in the western Cape Province, especially those further inland, periodically suffer severe losses as a result of damage caused by the sun. Table-grape growers generally suffer most since injury even to only a portion of the bunch, often detracts from its decorative value to such an extent as to make it inferior or even wholly unsuitable for marketing as table grapes. (Fig. 1).

These conditions led to the collection of data in regard to the relative susceptibility of all the most important varieties of table grapes to sunscald, and to the protection offered against sunscald by various types of trellises. Particulars about the method of collecting these data and the circumstances under which it was done as well as the conclusions drawn, are given below.



FIG. 1.—Almeria (Ohanez) is a variety which is so sensitive to sunscald that even bunches which hang in the shade are often completely disfigured by typical sunken scald spots.

Material.

For the purposes of the experiment a vineyard on the experiment farm Bien Donne, Groot Drakenstein, was used. The vineyard consisted of fifteen of the most important export varieties, all of which had been grafted to Jacquez rootstocks. Further, every variety in the vineyard was trained on various different types of trellises. The soil in the vineyard is a deep, fertile loam which is fairly level. Although the vineyard was only in its third growing season at the time of the experiment, all the trellises used in the experiment were already well covered with shoots, owing to the exceptionally favourable growth conditions.

Method.

On 26 December of the year in question the temperature in the vineyard rose to a maximum of 103.7°F. In addition the humidity was particularly low. This led to an exceptional degree of sunscald and consequently conditions were favourable for obtaining data.

Observations were made on the whole crop on thirty comparable vines of each variety which had been trained according to the Italian fish-spine and the slanting trellis systems. A count was taken of the berries on each individual bunch, based on a careful estimate of the percentage of berries damaged by the sun. A total of 2,827 bunches was examined in this way (Table I).

TABLE I.—*Number of bunches inspected and percentage of sunscald in each of fifteen table-grape varieties (26 December 1941).*

Variety.	No. of bunches inspected.	Percentage sunscald.	Variety.	No. of bunches inspected.	Percentage sunscald.
White Prince.....	126	33.6	Gros Noir.....	77	3.9
Flaming Tokay....	141	33.0	Red Emperor....	98	3.8
Raisin Blanc.....	355	25.1	Waltham Cross...	223	1.1
Rooi Hanepoot....	260	20.4	Gros Colmar.....	350	0.9
Almeria.....	50	19.6	Henab Turki.....	135	0.7
Wit Hanepoot....	299	18.8	Alphonse Lavallée.	308	0.4
Prune de Cazouls..	104	17.2	Barlinka.....	78	0.3
Molinera Gorda....	123	8.2			

With a view to comparing the various trellising systems, further counts were made on a similar basis on a total of four types of trellises in the case of the varieties Prune de Cazouls, Flaming Tokay, and Wit Hanepoot. (See Table 2).

Results and Conclusions.

The following is a summary and discussion of the results obtained:—

(1) *Comparative susceptibility of varieties.*—The results obtained in this connection are given in Table 1 and are further graphically represented in Fig. II.

Grapes of all the varieties concerned had previously received more or less the same treatment for factors likely to influence sunscald. Thus, for instance, they received the identical irrigation, sulphuring and cultivation treatment usual in such experiments.

It is a well-known fact that a grape is not equally susceptible to sunscald at all stages of its development. The higher the acidity, the greater the danger of sunscald. Generally speaking, the danger is greatest from the stage immediately before the berries attain their full size until they begin to change colour. After that the acids break up rapidly and the danger, therefore, practically ceases to exist. Consequently all these types, which include early as well as late varieties, could not have been at an equally susceptible stage when they became exposed to the destructive rays of the sun. On the whole, the grapes had nevertheless already reached a considerably advanced stage of development by 26 December and were at a dange-

rous stage as far as susceptibility to sunscald is concerned, since none of the varieties had yet begun to change colour.

It is clear from the data obtained that the susceptibility of various varieties to sunscald differs considerably. Thus, the damage varied from less than one per cent. in some cases to more than thirty per cent. of the crop in other varieties. In this estimate the fact that a small number of damaged berries in the middle of a bunch often makes the whole bunch unfit for table-grape purposes, was not even taken into account.

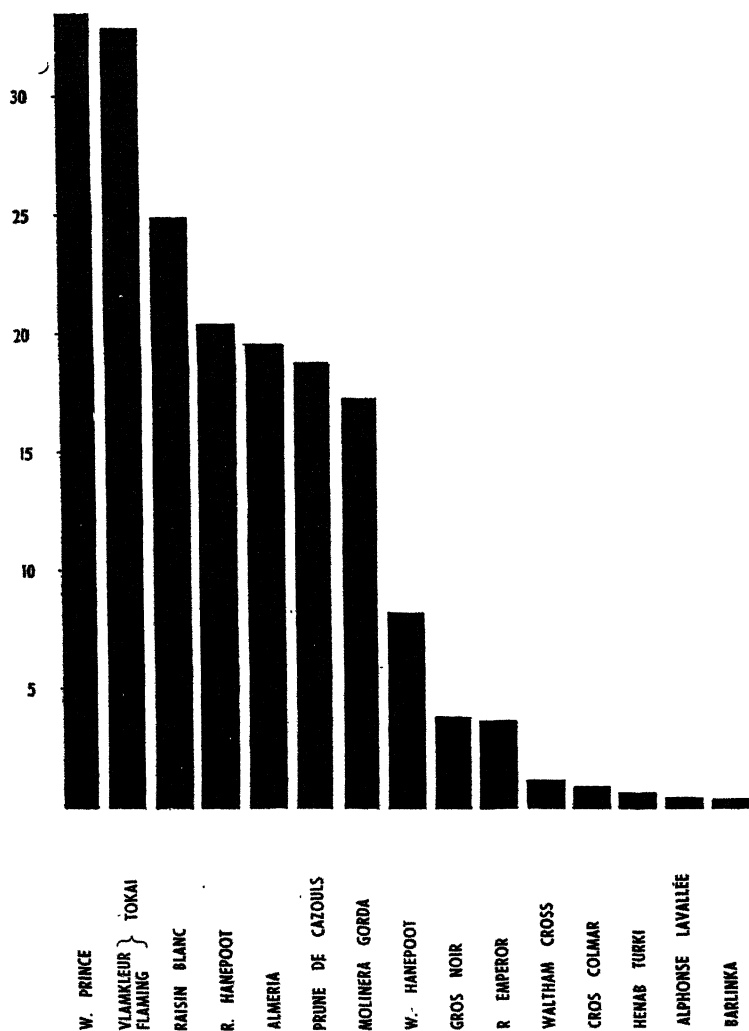


FIG. 2.—Relative susceptibility of table grapes to sunscald according to Table I.

White Prince, Flaming Tokay, Raisin Blanc, Hanepoot, Almeria (Fig. I) and Prune de Cazouls definitely belong to the group of more sensitive varieties. Of these Almeria is undoubtedly more sensitive than is indicated by the figures. In this case (Table II) the crop

SUNSCALD IN TABLE GRAPES.

was far too light to give a reliable comparative figure of its sensitivity to sunscald. This probably also applies to Barlinka, which falls under the less sensitive group, but according to our experience, is often badly damaged through sunscald, the more so since it is a late variety which is sometimes most severely exposed to the summer sun at its most sensitive stage. The data further reveal the interesting fact that the white and red varieties are, on the whole, most subject to sunscald, while the black varieties are more resistant to it.

(2) *Influence of trellising systems.*—In order to investigate the influence of trellising systems, additional data were obtained of 8 to 12 vines of each variety trained on Low Perold and High Perold trellises, in the case of the varieties Flaming Tokay, Prune de Cazouls and Wit Hanepoot (See Table 2).

TABLE 2.—*Influence of Trellising systems on sunscald in three varieties of table-grapes.*

Trellising system.	No. of bunches inspected.	SUNSCALD PERCENTAGE.			Average percentage sunscald (3 varieties).
		Flaming Tokay.	Prune de Cazouls.	Wit Hanepoot.	
Low Perold System.	116	37	53	32	37
Fish Spine.....	305	35	23	25	28
High Perold System	201	25	10	18	18
Slanting Trellis....	239	29	12	11	17

It is clear from the data (Table 2) that the height of trellising has an important influence on the degree of sunscald. Thus, in the case of the Low Perold trellis, the topmost wires of which were 2 feet 4 inches from the ground, the damage was most severe, being on an average 37 per cent. as compared with 18 per cent. for exactly the same type of trellis, the wires of which were 4 feet 2 inches high. In the case of the low trellis the unfavourable difference can be attributed to the heat radiated by the earth as well as the smaller space allowed for ventilation under the vines.

Another noteworthy fact is that the sunscald average of 18 to 28, viz. 10 per cent., was higher in the case of the Italian fish-spine trellis than in that of the High Perold trellis of the same height. The greater susceptibility to sunscald of grapes trained on a fish-spine trellis can be ascribed to the fact that the wires of this trellis are all at the same height, with the result that the grapes hang free of the leaves. Bunches on the outside of the trellis are, therefore, often caught by the harmful direct rays of the sun.

The trellis which offers most protection against sunscald is the slanting trellis, in spite of the fact that the grapes also hang free and that the trellis lies at an angle of 30 degrees to the afternoon sun. The posts of the slanting trellis are 4 feet 6 in. high. The protection against sunscald is, however, ascribed to the breadth of the trellis, viz. 5 feet. Since the vine shoot bears its crop close to its base, the vines can be pruned in such a way that the crop is not borne on the sides of the trellis, as is the case on the narrow 36-inch fish-spine trellis.

The overhead trellis which also offers good protection against sunscald if the vines make luxuriant growth, was not included in this comparison.

Measures against Sunscald

(1) Give preference to less sensitive varieties like Alphonse Lavallée and Waltham Cross, and as far as possible, avoid varieties like White Prince, Flaming Tokay, Raisin Blanc, Almeria and Prune de Cazouls. This is particularly advisable further inland, e.g. at Hex River, where the humidity is low and serious sunscald is of common occurrence.

(2) Where the sensitive varieties cannot be excluded, provision should be made for wide and reasonably high trellises, which will afford adequate protection for the grapes and allow of good aeration, while the bunches hang loose without danger of injury through abrasion. Should there still be danger of sunscald, the trellises should be laid out from east to west, in so far as this is compatible with the requirements in respect of contour, wind, etc. This is the direction followed by the sun, and consequently the direct rays will always fall more or less vertically where the covering of leaves protects the grapes.

(3) Be careful in applying sulphur, especially during the hot days just before the grapes begin to soften or change colour. The acidity of the berry is then at its peak and destructive sunscald is, therefore, very common. Do not sulphur during this period unless it is essential, and in any case make the application as light and even as possible. For the same reason the grapes should as far as possible be kept free from dust.

(4) Accustom the grapes to strong light gradually, by starting to sucker and thin out the leaves in good time. Be careful in exposing the bunches, especially after a cool early summer; do not tie up the shoot too suddenly or break off many leaves with a view to encouraging change of colour. Where it is necessary to stimulate the formation of branches or to obtain firmness, all shoots which become floppy at the critical stage should also be topped to prevent sudden exposure of the crop to the sun.

(5) Be careful to preserve the bloom of the bunches against unnecessary rubbing by leaves during the pre-thinning of the green berries since this waxy layer or bloom assists in protecting the berry against sunscald.

(6) When the crop is being thinned out at the green stage, it is preferable to remove the bunches on the outside of the trellis which hang lowest and will catch the afternoon sun.

(7) Guard against insufficient ventilation behind windbreaks which have become too dense, since the temperature can rise very high under such circumstances, especially where there are hollows in the soil.

(8) Keep the vinyard moist, especially when sunscald can be expected, or at least see to it that it has a reasonably luxuriant covering of leaves by providing the right drought-resistant rootstock and applying the correct general cultivation, fertilization, etc. In widely spaced vineyards, especially on white, sandy soil which reflects heat, grapes are very subject to sunscald.

Calf Rearing.

Dr. J. W. Groenewald, Senior Research Officer (Nutrition), Division of Veterinary Services, Onderstepoort and Dr. P. J. v. d. H. Schreuder, Senior Professional Officer, Division of Agricultural Education and Research.

WHEN milk products are sold, attention should be devoted to every possible source of wastage which tends to lessen the regular monthly income. The rearing of calves is usually a costly business. Consequently, it is necessary that the minimum quantities of milk on which a calf can be reared normally, without in any way impairing its health, should be known.

A mistake often made in this country is the indiscriminate rearing of every calf born. It would be far more profitable to select for rearing only calves which, in the owner's opinion, would justify the time and expenditure involved. Those calves that have no history in regard to production, or whatever quality is desired, should be sold as veal—or even destroyed.



FIG. 1.—A calf pen with maximum air and light (Glen College of Agriculture.)

When a calf is hand-reared, there is no reason why it should not thrive and be in just as good health as the beef calf which is allowed to run with its dam and suck whenever it feels so inclined.

Many farmers are situated in parts of the country where there is excellent cattle veld, but no possibility of growing supplementary feed, owing to the low rainfall. Where transport facilities exist in such areas, dairy ranching is generally resorted to with success. It would not be advisable, however, under these conditions to farm with high-producing cows, as they are liable to be milked to death.

Under dairy-ranching conditions, calves are reared in a number of different ways. There is always the temptation to obtain as much

milk as possible from the cows, often with irreparable loss as far as health and growth of the calves are concerned.

In some cases calves are allowed to suck only a little before and after milking, and during the day they are grazed in a small paddock. Calves reared under such conditions are stunted and thin as a result of mineral deficiency and a possible protein shortage. It would be advisable to supplement these deficiencies in the form of a lick. The quantity of milk allocated to each calf is often regulated by allowing

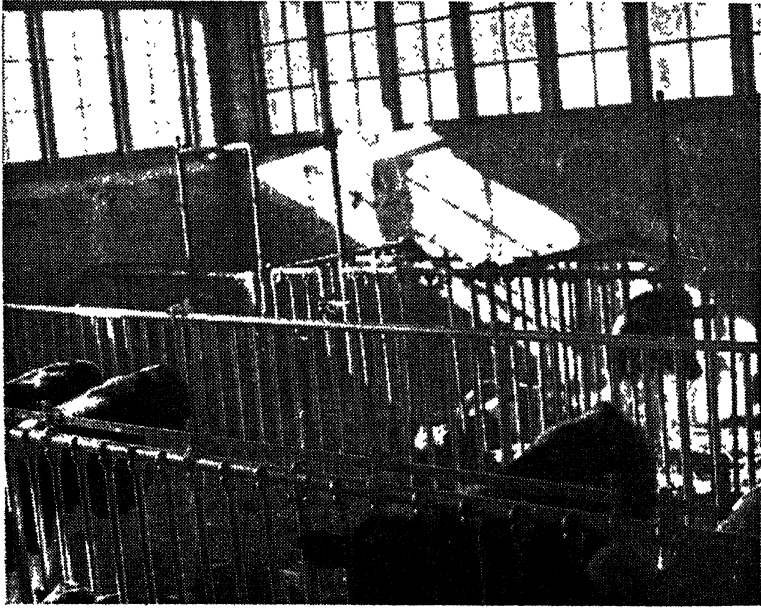


FIG. 2.—Interior of pen shown in Fig. 1.

the calf to have one or two quarters of the udder at each milking. Although this may be described as a step in the right direction, the calf is practically certain to receive an insufficient milk supply. The reason for this statement will be appreciated when one considers the fact that many cows on dairy ranches only produce about one gallon of milk daily, a quantity necessary for a two-weeks-old calf.

In order, therefore, that the calf may have a good start in life, it seems advisable to milk only once a day. Greatest success in the raising of calves is attained where the calves are separated from their dams in the evening, and the cows milked the following morning. During the day the calves should be allowed to run with the cows in the veld. Small calves are capable of walking remarkably long distances; in fact, herd-boys usually find it difficult to manage a herd of cows with their calves. For these reasons, and because of transport difficulties, some dairymen prefer to milk in the evenings, the calves being shut up in the kraal during the day. It must be pointed out, however, that calves which run with the cows during the day, will learn to graze the natural veld at an early age.

Calves should be adequately supplied with fresh, clean water at all times. Water from frozen troughs, however, as is often seen during winter, is definitely harmful to calves and young stock.

Under dairy-ranching conditions, calves should be supplied with phosphatic supplements at an early age. These animals do not receive

the quantity of milk and additional concentrate supplements usually fed when calves are hand-reared. Phosphorus may be supplied, either in the form of licks or as a daily dose. The quantities to be dosed daily are 3 ounces of bone-meal or 2 ounces of degelatinized bone-flour, or 1 ounce of di-calcium phosphate, placed on the back of the tongue with a spoon. The two last-named substances should be moistened with water before being administered. Licks are mixed in the following proportions by weight: 3 parts of bone-meal and 1 part of salt, or, 2 parts of degelatinized bone-flour and 1 part of salt, or, 1 part of di-calcium phosphate and 1 part of salt.

When di-calcium phosphate is used, a guarantee should be obtained from the seller as to the fluorine content of the substance. If the fluorine content of di-calcium phosphate exceeds 0.5 per cent., it may prove harmful to animals.

The present high standards of maximum milk production have created a cow giving quantities of rich milk much in excess of the normal requirements of the calf. It would therefore be unwise, from a health point of view, to allow a calf from such a cow to gorge itself with milk. The digestive system of the young calf is very sensitive to changes of diet, large quantities of feed, dirt, and changes of temperature. Hence, it is at all times necessary to be absolutely punctual and very precise in the matter of feeding. Strict adherence to the factors just mentioned will ensure a happy, "flashy" calf, whose unstunted growth will soon repay the extra attention given to its feeding and management.

In urban areas, whole-milk is generally retailed, the result being that no skimmed milk is available for calf-rearing. In some instances such dairymen resort to nurse-cows with success.

Care of the Cow.

It is desirable that the cow should be in good physical condition prior to calving, in order to ensure a healthy calf. The cow should be dried off 6 to 8 weeks before calving time. During the "dry" period she should receive a good, fairly nutritious and laxative ration. The nutritional requirements of the foetus for the greater part of the gestation period are naturally small, yet it is necessary to supply the cow with an adequate supply of feed to build a well-developed calf. Failure to give a good cow the needed rest results in her having to start the next lactation in too low a condition. The feeding problem of a cow that is due to calve is practically solved where she has access to good grazing. If the cow is low in condition, she should receive, in addition to pasture, 4 or 5 lb. of grain daily. A good grain mixture may be made up from equal parts of maize meal, wheaten bran and ground oats. If no grazing is available, it is essential to supply the cow with some silage or green feed, in order to provide a laxative ration. About a week before calving, the grain ration may be reduced or completely withdrawn. A few feeds before calving may consist of a wet mash of equal parts of ground oats and bran, mixed with warm water. Every effort must be made to keep the cow from becoming constipated, as this increases the possibility of difficulty at calving.

Exercise is essential to the dry cow. A cow giving 2 gallons of milk should not take longer than 2 weeks to dry off. A good plan is to keep such a cow in the byre—if she is accustomed to graze, but off her grain ration—and give hay only. Milk only once daily for the first four days; then relieve the udder every other day for a period of about a week. In this connection it is wise to be careful, but the farmer should not be unduly alarmed, for unless the udder has some defect,

no harm will result. When the udder is dry and in a good pliable condition, feeding may be resumed.

Care of the Calf.

Provision should be made for the calf to be born in sanitary quarters. The pen must be clean, light, well-ventilated, and comfortable. In order to avoid infection with any of the calf diseases, the pen should be cleaned and lime and dip used on the floor, as well as clean straw put down for bedding. It is advisable to allow the cow to occupy the calving pen for a few days prior to calving. Weather conditions generally favour outdoor calving in

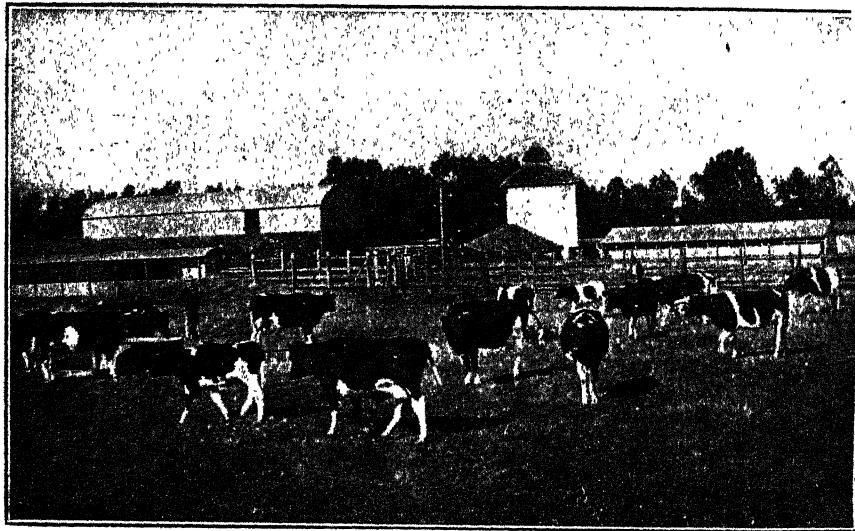


FIG. 3.—Frieslands at the Potchefstroom College of Agriculture, with barns, silos, stalls and dip in the background.

this country. This is desirable, provided that the cow calves in a clean grassy paddock. During the ordeal of calving, careful and prompt attention may be necessary. Experience enables one to gauge fairly closely when the calf will come. The pronounced loosening of the vulva and the "falling away" on either side of the tail setting are fairly reliable indications that calving is near. Another reliable guide is the filling and distention of the teats. During calving the cow should be disturbed as little as possible. A cow should calve down within an hour of onset of parturition.

If the cow has calved normally, she will immediately lick her calf. This act assists in drying the calf and starting respiration, and also helps the blood circulation. Should foetal membranes cover the nostrils, these must be removed promptly. It is always desirable immediately after birth to wash and disinfect the navel of the newborn calf with a disinfectant such as tincture of iodine or carbolic acid.

A strong calf will usually attempt to rise in about 15 to 20 minutes, and will be drinking within about half an hour. If, after an hour, the calf has not had a drink, it may be advisable to give it

some assistance. It is essential that the calf should get the first milk or colostrum, which has special laxative properties, as well as additional qualities which are necessary to start the new-born calf on its career. Colostrum, for instance, has the property of providing the calf with certain anti-bodies which fortify the animal against the many infections liable to occur at this delicate age. Occasionally, when the calf fails to receive the first milk or colostrum from its dam, the meconium is retained, because the bowels remain inactive. In this case a teaspoonful of castor oil may be given at frequent intervals until there is a movement of the bowels.



FIG. 4.—Agricultural club members with calves reared by them.

The colostral milk period in cows generally lasts for seven days after parturition. There is therefore no reason why the new-born calf should not have the full benefit of this essential product. Although the vitamin A content of colostrum is dependent on the feed consumed by the cow, it may be taken as approximately ten times as high as that of ordinary milk. The vitamin D content is also several times greater than in ordinary milk. It may similarly be indicated that minerals such as CaO and P_2O_5 are considerably higher in colostrum than in milk. These factors are a definite contribution to the future health of calves. If calves are allowed their full share of colostrum, less diarrhoea, pneumonia and greater resistance to infections may be expected.

The nutrient requirements of a young calf weighing 100 lb. may be given as follows:—

	Dig. Prot.	T.D.N.	Ca.	P.	Carotene.	Vit. D.
In 10 lb. milk.....	0.33	1.6	5.5	4.1	7,500	80
In $\frac{1}{4}$ -lb. grain.....	0.06	0.4	0.2	1.4	550	—
In $\frac{1}{8}$ -lb. hay.....	0.05	0.3	3.4	0.5	16,000	300
TOTAL.....	0.44 lb.	2.3 lb.	9.1 gm.	6.0 gm.	24,050 IU.	380 IU.
Required.....	0.45 lb.	2.0 lb.	8.0 gm.	6.0 gm.	10,000 IU.	300 IU.

Although the B-complex vitamins are synthesized in the rumen, young calves may not be considered ruminants in the strict sense. There may therefore be occasions when niacin would have to be supplemented. These would, however, be exceptional cases.

Teaching the Calf to Drink.

The calf may be separated from the cow immediately after having had its first drink, or it may be allowed to remain with its dam for one or two days. If the udder is much inflamed, frequent sucking by a calf is desirable. If left together longer, both the cow and the calf will be more disturbed when they are finally separated. Most calves will learn to drink from a bucket in a few minutes, especially if they are hungry. The best method is to allow the calf to suck one's fingers; the hand can be gradually lowered into the bucket and submerged in the milk sufficiently deeply to allow a little of the milk to be taken by the calf. The fingers can then be withdrawn gradually so as not to arouse suspicion. One lesson may suffice, but if it does not, the procedure must be repeated until the calf will drink from the bucket on its own. Here success comes only with patience.

The Whole-Milk Period.

As already mentioned, the hand-rearing of calves is in the best interests of both calf and dairyman, yet it is not always an easy task. Some dairymen are inclined to favour the use of nurse-cows. This method of raising calves has its possibilities, provided cows of a suitable type are obtainable, and that the number of calves allotted to each cow is such that they all get sufficient milk. For instance, one quarter of an old cow producing 4 gallons of milk daily could be given to each of four calves. This question, however, must be left entirely to the discretion of the farmer.

It is naturally desirable, for economic reasons, to have the whole-milk period as short as possible. Nevertheless, best results are always obtained when conditions approximate to those of Nature. It has been shown that if there is 3 to 5 per cent. of butterfat in milk, it passes more easily through the digestive tract than does skimmed milk.

When the calf is taken away from its dam, it should not be over-fed. There is generally more risk of over-feeding at this stage than there is of under-feeding. A useful rule is to give the calf approximately 1 lb. of milk daily for every 10 lb. of its weight.

The birth weights of calves are approximately as follows: Ayrshire, 66 lb.; Guernsey, 64 lb.; Friesland, 94 lb.; Jersey, 54 lb. Calves of all mixed breeds may, as a rule, be taken to weigh approximately 70 lb. at birth.

A Jersey calf weighing 54 lb. would therefore be given about 5.5 or 6 lb. of milk per day, whereas the 94 lb. Friesland may get as much as 10 lb. The milk must be fed at about body heat. Best results are obtained when calves are fed 3 times a day at this stage. The general practice among many dairymen is to feed twice daily from the outset. It is necessary that feed buckets should be scalded and kept in a clean place after feeding. Irregularities such as the use of unhygienic utensils, may result in dirty and sour milk, which, in turn, is a certain cause of scours.

In ordinary circumstances the whole-milk period lasts for 3 weeks. The increase in milk fed from the first day is about $\frac{1}{2}$ lb. every second day, until the calf is 3 weeks old.

The Skimmed-Milk Period.

When a calf has been on whole-milk for 3 weeks, skimmed milk is substituted for the whole-milk. The change from whole-milk to skimmed milk should take place gradually. The procedure usually adopted is to replace 1 lb. of whole-milk by 1 lb. of skimmed milk daily until, after a week or ten days, the calf is entirely on skimmed milk. As a rule, calves are fed skimmed milk until they reach the age of 6 months. Buttermilk or whey may to some extent take the place of skimmed milk. Both these feeds, however, are often stored in dirty containers.

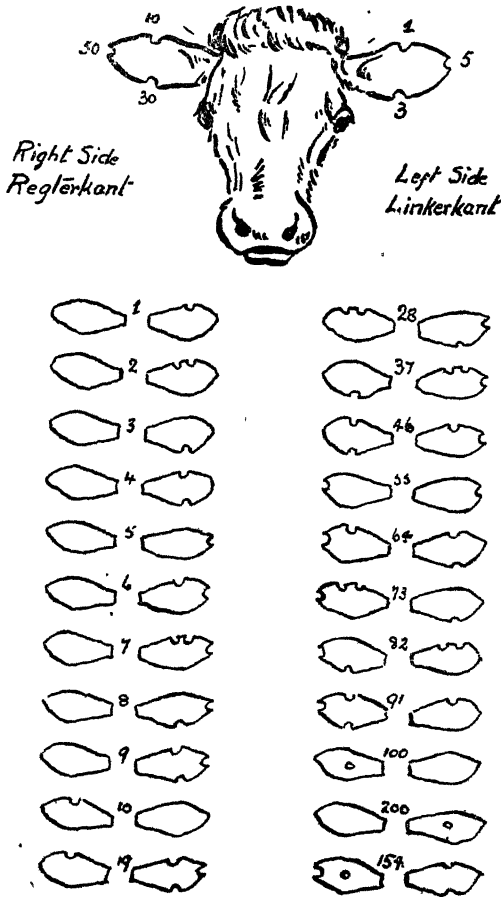


FIG. 5.—The valuated notch ear-marking system.

It must be borne in mind that these substances are derived from mixed milk at creameries, and are liable to be infected with *tubercular bacilli* or other pathogenic organisms. Buttermilk is also unreliable in that it often contains excessive amounts of wash water. Whey, on the other hand, lacks the protein which is present in buttermilk or skimmed milk. When whey is used, success can be obtained only by inducing the calves to take a protein supplement in the form of a grain mixture. The following grain mixture may be fed along with whey and a legume hay: 3 parts of ground maize and 3 parts

of linseed oil-cake meal. Dried skimmed milk is expensive in this country, but where it is obtainable it is mixed with water, and fed. One part of dried skimmed milk is added to 9 parts of water, and is then equal to 10 parts of ordinary skimmed milk.

When skimmed milk forms the major feed, Table I may be used as a guide:—

TABLE I.—*Rearing Calves on Skimmed Milk.*

Age of calf.	Wholemilk.	Skimmed milk.	Grain.	Hay.
	lb.	lb.	lb.	lb.
1 to 2 days.....	With dam	—	—	—
2 to 14 days.....	5 to 10	—	—	—
2 to 3 weeks.....	10 to 1*	1 to 10*	$\frac{1}{3}$	Free access.
3 to 4 weeks.....	—	10	$\frac{1}{4}$	"
4 to 5 weeks.....	—	11	$\frac{1}{4}$	"
5 to 6 weeks.....	—	12	$\frac{1}{4}$	"
6 to 8 weeks.....	—	13	1	"
8 to 12 weeks.....	—	14	2	"
12 to 24 weeks.....	—	16	3	"

* In the first case the whole-milk is gradually decreased, while the skimmed milk is increased accordingly. Where dairy farming is practised successfully, a milk scale becomes an essential. On the farm a gallon is taken to represent 10 lb.

Where only a Limited Quantity of Whole-Milk is Available.

It frequently happens that calves have to be reared on a limited quantity of whole-milk, because no skimmed milk is available. In this case it should be remembered that the secret of success lies in giving the calves a good start on whole-milk. At the same time, they should receive every possible encouragement to eat grain and hay. (See Table 2.)

TABLE 2.—*Raising Friesland Calves on a Limited Quantity of Whole-Milk.*

Period in days.	Period in weeks.	Whole milk per calf daily.
1st day, with dam.....	—	—
2nd day, dam's milk.....	—	4 pints.
3rd to 7th day, dam's milk.....	—	6 pints.
	2nd week	8 pints.
	3rd week	8 pints.
	4th week	8 pints.
	5th week	8 pints.
	6th week	8 pints.
	7th week	8 pints.
	8th week	6 pints.
	9th week	4 pints.

Another method of raising calves on a minimum quantity of whole-milk is to give a milk substitute. No such substitute can, however, take the place of milk with entire satisfaction. The calf meals or gruels are not as easily digested as milk, with the result that digestive disturbances are more common. A simple gruel may be mixed, in equal parts by weight, as follows:—linseed-meal, blood-meal and pollards.

One part of the above gruel mixture is mixed with 8 parts of water, and brought to the boil. The gruel is then allowed to cool, but it should always be fed at body heat. Where gruel is used as the major feed, calves may be fed as shown in Table 3.

TABLE 3.—*Feeding Gruel to Calves.*

Age of calf.	Milk.	Gruel.	Grain.	Hay.
	lb.	lb.	lb.	lb.
1 to 2 days.....	With dam	—	—	—
2 to 14 days.....	10	—	—	—
	dam's milk			
2 to 3 weeks.....	9	1	—	—
3 to 4 weeks.....	9	3	$\frac{1}{2}$	Free access
4 to 6 weeks.....	6	6	$\frac{1}{2}$	"
6 to 8 weeks.....	—	12	$\frac{1}{2}$	"
8 to 12 weeks.....	—	14	1	"
12 to 16 weeks.....	—	14	2	"
16 to 20 weeks.....	—	—	4	"

The quantity of milk or gruel given depends largely on the size or weight of the calf. Jersey calves, for instance, will be found to thrive better on smaller quantities than given in Tables 2 and 3, especially if they are fed only twice daily. The condition of the faeces should always be carefully watched, and the milk reduced in case of diarrhoea.

The Feeding of Grain and Hay.

There is considerable doubt as to the desirability of allowing a calf roughage at too early an age. Calves will be seen to nibble at feeds when they are only a few days old. A few handfuls of grain fed dry, and a little hay may be given in order to induce them to eat. At 3 weeks calves will consume approximately the quantities given in the accompanying tables. These are only approximate guides, and should be followed with discretion. Calves should be fed so that their mangers are always clean. They relish whole grain. Whole maize or oats may be given. It may also be desirable to feed bran or oil-cake meal, but never feed cotton-seed meal to calves. A mixture that has given excellent results is: 3 parts of ground maize, 3 parts of crushed oats, 1 part of bran and 1 part of linseed oil-cake meal, or peanut oil-cake meal. This grain mixture may be modified to some extent, with equally satisfactory results. The main thing is to watch for digestive disturbances. If these occur, the grain mixture will either have to be cut down or changed. Perhaps all that will be necessary is to give less lucerne hay. Bran and oil-cake meal are desirable on account of their added phosphorus and protein content as well as laxative effect.

Feeders differ as to the desirability of silage for young calves. There is no danger, however, as long as calves consume all the silage

before them. Danger of scours occurs only when the silage has been allowed to accumulate in the mangers, or when it is mouldy. When calves are properly fed, there is no need for them to be let out to pasture. Pasturing inadequately fed calves on poor veld before they have reached the age of 6 months tends to make them paunchy. However, they should at all times receive sun and exercise.

Calves should always have free access to fresh, clean water. An abundant milk supply does not make up for the water that a calf requires.

If calves are reared along the lines prescribed above until they are 6 months old, no mineral supplement will be necessary. Serious consequences may be expected should a nutritional deficiency occur during the first six months of the calf's life. The ration should be such that calves will make at least normal growth for the breed, which, according to the Missouri Research Station, is given in Table 4.

TABLE 4.—*Normal Weight and Height at Withers of Females.*

Age (months).	Frieslands.		Jerseys.		Ayrshires.	
	Height.	Weight.	Height.	Weight.	Height.	Weight.
	Inches.	lb.	Inches.	lb.	Inches.	lb.
Birth.....	28·3	90	26·0	55	—	69
1.....	30·2	121	27·7	76	27·5	90
2.....	32·3	157	29·4	105	29·5	128
3.....	34·2	200	31·2	140	31·2	170
4.....	36·2	249	32·9	174	33·1	218
5.....	38·0	302	35·1	222	35·1	254
6.....	39·7	349	36·9	260	36·4	286
7.....	40·9	389	38·1	302	37·3	304
8.....	42·2	425	39·3	350	38·5	336
9.....	42·9	466	40·5	376	39·0	366
10.....	43·8	501	41·3	407	39·6	406
11.....	44·3	529	41·9	432	40·1	427
12.....	44·8	558	42·6	456	40·7	456
13.....	45·6	574	43·3	480	41·3	485
14.....	46·2	596	43·8	503	42·0	533
15.....	46·8	612	44·4	520	42·4	547
16.....	47·4	643	44·6	533	42·7	560
17.....	47·7	660	45·1	553	43·1	579
18.....	47·9	686	45·5	572	43·7	604
19.....	48·3	715	46·0	598	44·2	627
20.....	48·7	746	46·3	621	44·6	651
21.....	48·9	774	46·5	649	44·9	679
22.....	49·2	796	46·8	668	45·4	707
23.....	49·5	824	47·2	689	45·6	733
24.....	49·8	841	47·4	716	45·9	759

Common Calf Troubles.

When calves have had their milk feed, they will invariably start sucking each other. This vice often becomes serious, for not only is hair swallowed, but udders, navels and scrotums may be damaged. A good plan is to feed the grain mixture after the calves have finished their milk. Cheap but effective wooden stanchions are often employed to prevent this vice, and they make the feeding of calves safe and easy. These are made by bolting uprights, 6 inches apart, to a horizontal beam placed along the ground. A second horizontal

beam, about 4 feet high, completes the stanchion, every second upright being left loose on the upper beam, so that it acts scissors-like, and the head of the calf may easily be secured.

More calves are stunted because of common scours than through insufficiency of feed. This defect is liable to occur under the best feeding conditions. The most frequent cause of common scours is over-feeding. Hence, it is always essential to reduce the feed. Good results have been obtained by reducing the milk feed to half the daily supply in cases of scours. Water is then added to the milk, making the feed up to 1 part of milk and 1 part of water. The calf may be fed on water and milk until improvement is noticed. The quantity of water is then gradually diminished and replaced by milk, until the calf is on its regular quantity of milk. The usual method of treating calves that have common scours, is to give them a dose of 1 to 3 ounces of castor oil. A tablespoon of lime-water may also be added to each quart of milk.

The addition of pure lime (calcium carbonate) as a routine procedure at each feeding period has given excellent results, and is a good preventive measure against scours.

Flies often abound in calf pens and where calves are fed. Various fly repellents may be used, but the greatest success is usually attained by applying preventive measures. Flies hatch in wet and damp places, or in the droppings of animals. The best method of dealing with flies is therefore to keep the surroundings clean and dry.

New Bulletins.

Bulletin No. 260 "The Nutrition of Poultry" by Prof. A. M. Gericke has recently been published.

It is obtainable from the Editor of Publications, Department of Agriculture, Pretoria, at 6d. per copy.

Black Quarter.

Dr. E. M. Robinson, Division of Veterinary Services,
Onderstepoort.

ONE of the problems the South African cattle farmer has to deal with is the disease known as black quarter (*sponssiekte*). It has a very wide distribution but is more common in ranching country such as the bushveld of the Transvaal, and is essentially a disease of uncultivated land. It occurs in cattle between the ages of six months and three years, but is sometimes, though rarely, seen in young calves or adult cattle. It is commoner in the spring and summer months, but may occur at any season of the year.

Symptoms.

The affected animal usually shows lameness in one or both hind legs but the fore legs may also be affected. There is a high fever, the animal is very dull, and usually stands away from the herd. There is usually a hot, painful swelling of the big muscles of the hip region of one or both hind legs and no weight can be put on the foot, the limb often being dragged. If the swelling is handled, it has a crackling feel, as if there were gas present under the skin, which is actually the case. Drops of a reddish fluid sometimes exude through the skin. Affected animals usually die within forty-eight hours, and recovery is very rare. If the fore leg is affected, the swelling occurs in the muscles of the shoulder and sometimes of the neck.

Post mortem Changes.

If one cuts into the muscles of the affected quarter one sees that there is a considerable amount of reddish fluid between the muscles, and bubbles of gas escape from it. The muscles are reddish black and spongy-looking, and, if closely examined, small holes can be seen in them where pockets of gas have formed. The internal organs are very congested, but the blood usually clots well, unlike in anthrax where it remains fluid.

Prevention.

Treatment of cases of black quarter is rarely successful and is hardly worthwhile attempting. As the organism causing the disease, which is one of the gas gangrene group of bacteria, only growing in the absence of air, has a very wide distribution in the soil of some parts of the country and can live for long periods outside the animal body, it is not practical to try and get rid of it. All that one can do is to destroy carcasses by burning or deep burial, and to rely on preventive inoculation to control the disease.

A very efficient vaccine is produced from cultures of the black-quarter bacillus by killing them with formalin and inoculating animals with the dead bacteria. It has been found that the addition of alum to the vaccine results in its being more slowly absorbed, and in consequence a better immunity is developed.

Cattle should be inoculated annually up to the age of three years, after which further inoculation is not necessary as a rule. If calves are inoculated before they are six months old, the resistance does not last very long and it may be necessary to reinoculate at about nine months to a year.

In recent years it has been found that heavy losses from black quarter in sheep sometimes occur shortly after shearing. This is due

The Preparation of Skins for the Market.

P. D. Rose, Senior Lecturer in Sheep and Wool, Grootfontein College of Agriculture, Middelburg, Cape.

PART 2: DRYING, STORING AND PACKING.*

AFTER the skin has been left rolled up for at least 24 hours to effect thorough salt penetration it must be opened up to dry.

Excellent results are obtained by drying the skins on a slatted wooden platform. A suitable and inexpensive platform can be

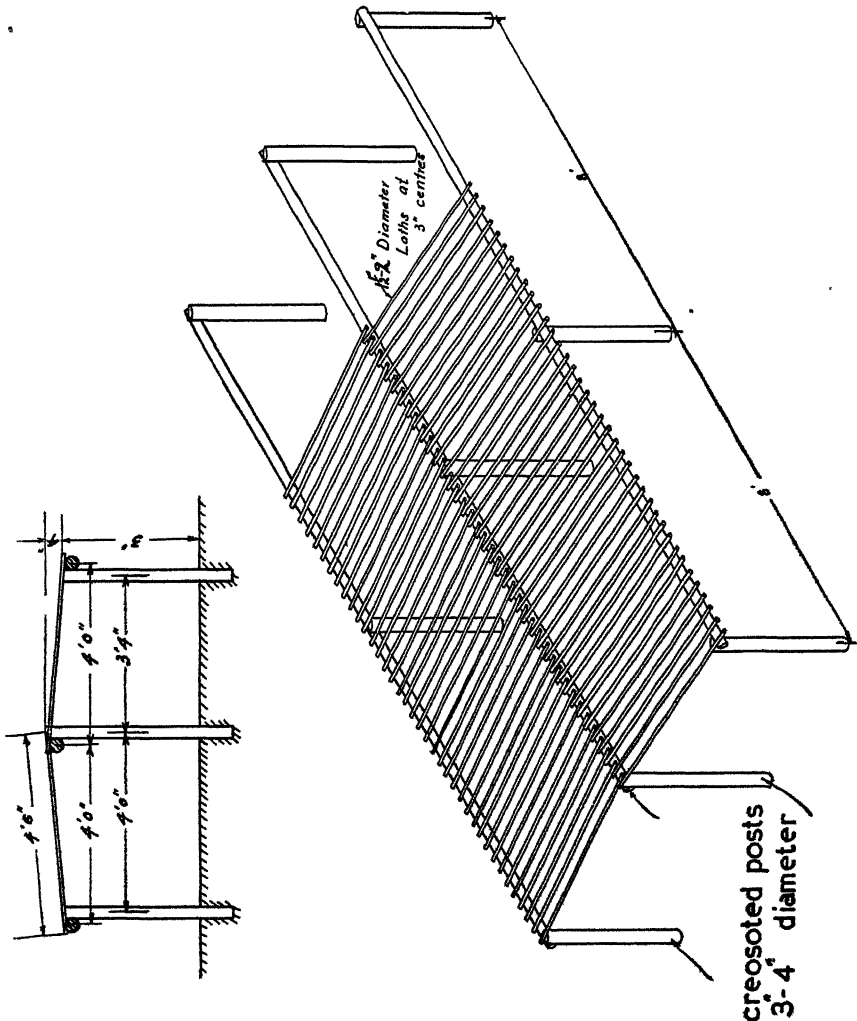


FIG. 1.—Frame for drying of skins.

* The first part of this article appeared in the July 1946 issue of *Farming in South Africa*.

made with wooden fencing droppers spaced 2 in. apart. The frame should be slightly lower at one end in order to effect drainage. (Fig. 1.) The use of a wire netting platform should be avoided because if the skin comes into contact with metal of any kind, stains are produced in tannage. Skins dry readily on a raised platform and the chances of beetle infestation are considerably reduced. Do not hang skins over a sharp support such as a wire fence or upright pole. The whole weight of the skin is naturally borne by that portion of the skin in direct contact with the support and stretching at that

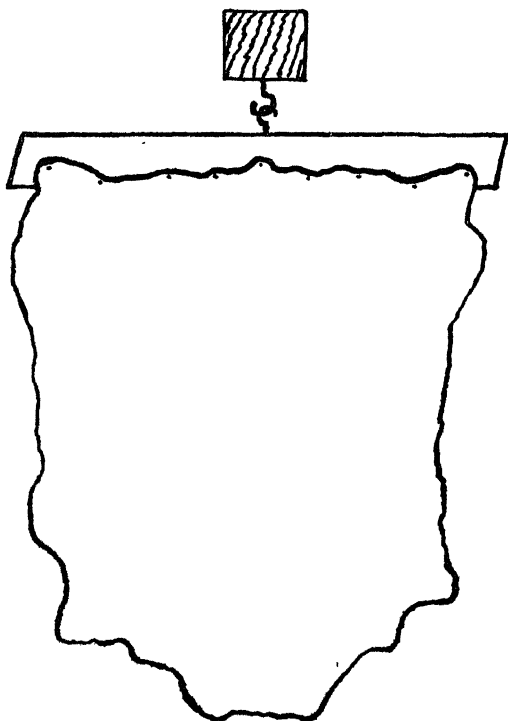


FIG. 2.—The skin is attached—tail-end—to the hanging board by means of 1 in. wire nails, spaced 6 in. to 8 in. apart, $\frac{1}{8}$ in. from the edge of the skin.

spot results. (See Figures 7 and 8; also remarks under Pegged Skins.) If it is necessary to hang the skins for drying, they should be thrown lengthwise over broad poles or beams. Should the skin be left on the ground, heat is generated and the moisture in the ground is drawn to the surface. The conditions which attract and favour the development of skin beetles, namely, darkness, heat and humidity, are thus created.

Drying should be done in the shade, preferably in a place where air circulates freely. Skins should never be dried in the direct rays of the sun, because the surface dries so rapidly that internal moisture cannot escape. The sealed up moisture generates heat which often results in degeneration in the fatty layer of the skin. The fault is not visible in the raw skin, but splitting often occurs in the tanning process, rendering the skin valueless. This is especially so in skins which have not been rolled for 24 hours after salting. Special precautions should be taken with all classes of "leathery" pelts.

Skins dried on a raised platform, in the shade, take on an average from two to three days to become sufficiently wind-dried for subsequent treatment as recommended later.

Storage.

The question of suitable storage room is usually a problem on the average farm. Because of the lack of room skins awaiting despatch to the coast, or the local skin-buyer's visit, are invariably stacked in some odd dark corner, as far out of the way as possible. Consequently, the essentials for the well-being of the moth and

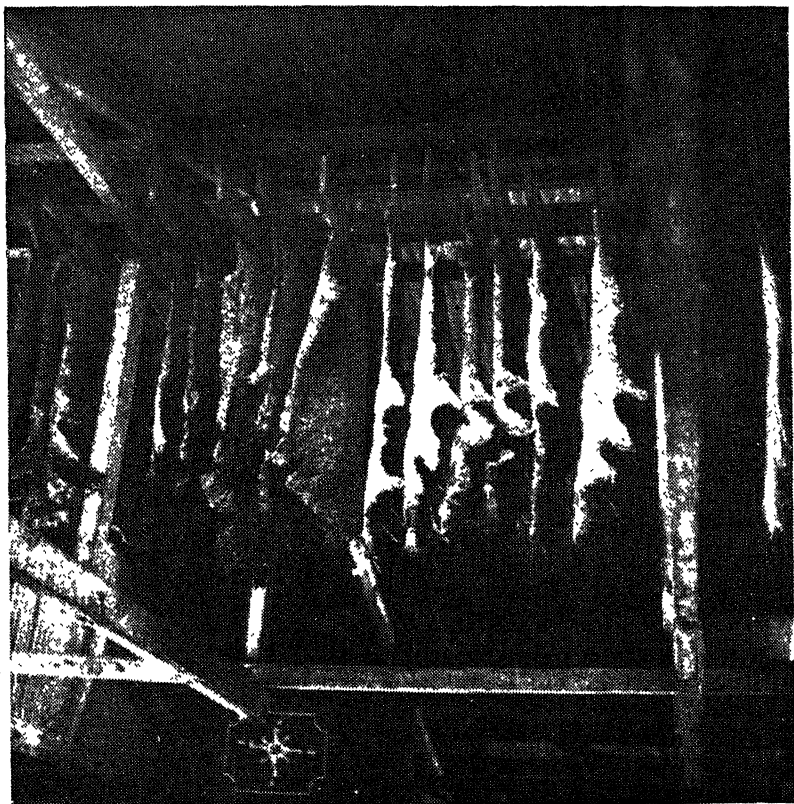


FIG. 3.—This photograph shows the space above the tie-beams of a pitched-roofed building which can be utilized to advantage for storage purposes. The skins shown were left undisturbed for a period of two years and 7 months.

dermestid beetle are present, namely, heat, darkness and lack of air circulation. Piling one skin on top of another further encourages their ravages, because skins packed in this manner usually sweat.

With a view to solving this problem and thereby saving the farmer and the country considerable sums of money, the writer devised and tried out the following method, the results of which have proved most satisfactory.

After the skin has been thoroughly wind-dried as previously recommended, the tail end should be attached, by means of 1 in. wire nails, to an old flooring board 3 ft. 6 in. long, as shown in

Fig. 2. The nails must be inserted not more than $\frac{1}{8}$ in. from the edge of the skin at intervals about 8 in. apart. No stretching will result if the skins have been thoroughly wind-dried. Each board should be hung from a hook in a beam, the hooks being 6 in. apart to allow air to circulate freely. (See Fig. 3.) Suitable space for this purpose is available above the tie-beams of any pitched-roof building. The damage to skins stored in this way for a period of 2 years and 7 months was negligible.

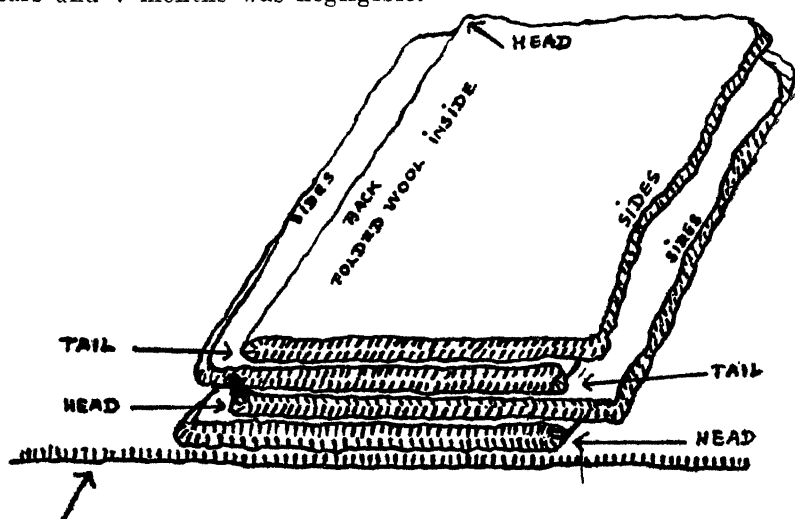


FIG. 4.—End view of bundle of Merino skins showing method of packing: The sides are allowed to project over the backs in each case for protection. By alternative head—head, tail—tail, a nice square bundle is obtained. The projecting edges of the damaged or dead skin placed on the top and bottom of each bundle are folded against the sides of the bundle for further protection before tying.

Note: For reasons previously given, the small holes made by the wire nails should be clipped off with a pair of sheep shears before the skins are packed.

If it is not possible to hang the skins as suggested, sprinkle one oz. of sodium silicofluoride evenly over each skin as it is laid in the pile. Sodium silicofluoride costs approximately 3d. per lb. and will assist materially in warding off beetle attack.

Damage by Rodents.

To frustrate rats and mice a large piece of flat sheet iron should be fixed over the ends of the beams from which the skins are hung.

Preparation Prior to Packing.

Skins must be well dried before packing. If they are packed in a wet or damp condition they must be dried by the broker before they can be offered for sale. This causes considerable delay and inconvenience to the broker, while the farmer pays railage on excess moisture for which he receives no return.

In dry, hot climates skins often become so brittle that they crack very easily when folded. If this is the case, the correct pliability for packing can be restored by artificial means where a suitable room is available. If no provision has been made for hanging the skins as recommended, they should be raised from the floor and packed on boxes or poles. The floor should then be thoroughly wetted, care

being exercised that no water comes into direct contact with the skins. If the room can be closed the atmosphere can be further humidified by the use of an atomizer spray. Excessively dry skins will absorb sufficient moisture in 24 hours to render them perfectly pliable but not damp.



FIG. 5.—Neat bundle ready for despatch. Note how the sides of the two dead or damaged skins form a very effective protection to the rest of the skins.

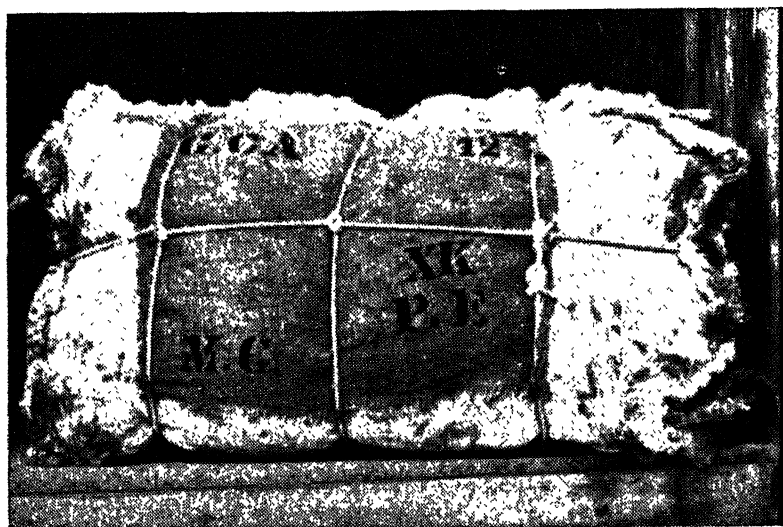


FIG. 6.—Neatly tied bundles with hessian inserted beneath the tie-ropes.

G.C.A. = Name or initials of consignee.

12 = Number of bale.

M.G. = Code mark of sending station.

X.K. = Name or initials of broker.

P.E. = Code mark of receiving station.

All skins contain a certain amount of fresh salt which, in transit, works loose with subsequent loss of weight on every parcel. This is often the cause of much ill-feeling and correspondence between farmer and broker. All free salt should be brushed off before packing; it is no use to the skin and buyers do not want it. So why pay freight on useless material?

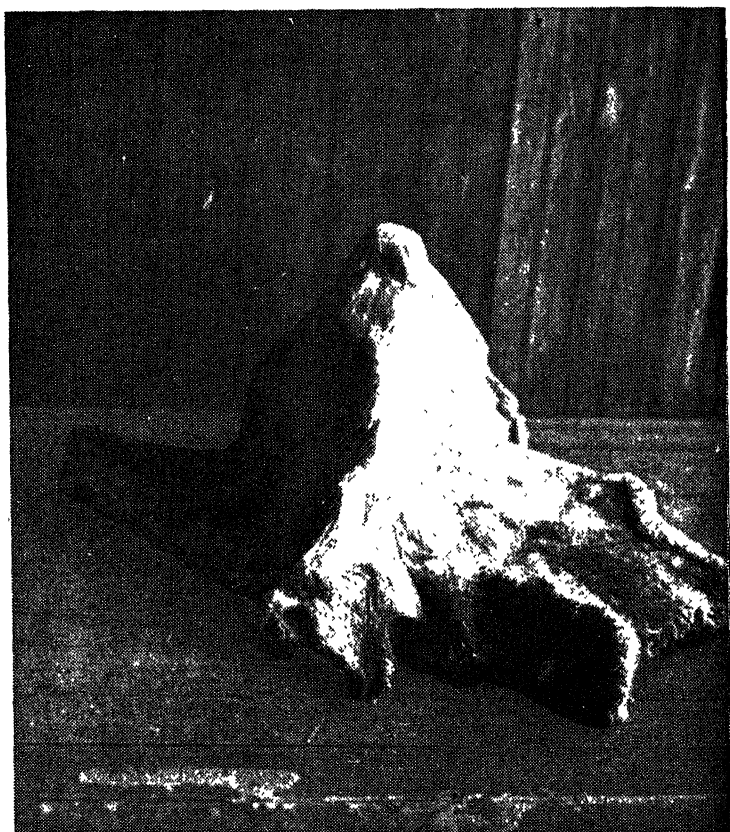


FIG. 7.—Crossbred skin hung over an upright pole to dry. The usefulness of the pelt itself has been utterly destroyed.

Sorting.

Farmers are strongly recommended to classify skins before bundling. First sort out all dead and damaged skins. This class of skin is worth considerably less than sound skins and can be utilized to advantage as a protective covering on all bundles. Then sort into various sizes; if skins of similar sizes are bundled together, neat square bundles can be made. These suggestions should be followed for all classes of skins.

However, as the price of Merino skins depends primarily on the length and quality of the wool, they should be further sub-divided into the following classes:—

Combings—wool 2 in. or over.

Longs—wool $1\frac{1}{2}$ in. or over.

Mediums—wool 1 in. or over.

Shorts—wool $\frac{1}{2}$ in. or over.

Shearlings or pelts wool—short shorn.

It is not always possible to get a sufficient number of skins for a bundle of each of the above classes. Nevertheless, classification is strongly advocated because it is desirable that the owner should know the weight and approximate value of the consignment.

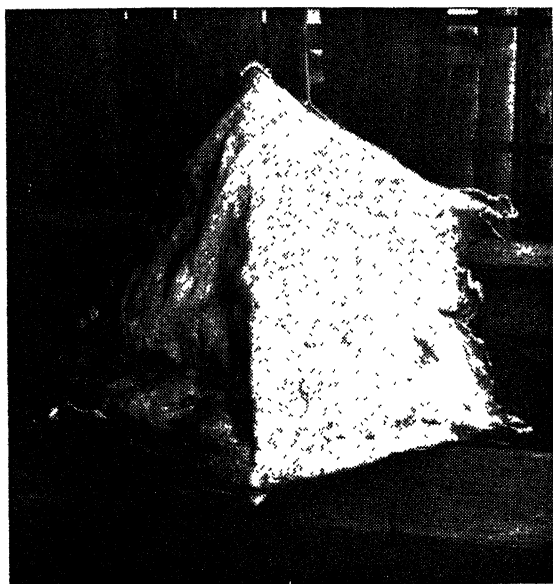


FIG. 8.—Blackhead Persian skin hung over a wire fence to dry. Note the stretching which has resulted at the point of contact. Skins so cured are classed as damaged and worth 4d. instead of 4s. 5d. each (market rates, September, 1943).

Weighing.

After the skins have been classified as suggested, it is advisable to weigh the loose skins so as to ensure that the weight of each bundle does not exceed 80 lb. If the bundles weigh more, they are difficult to pack and handle in transit, with the result that many skins are torn and otherwise damaged. The weight of each bundle should include that of the two dead or damaged skins, which, as previously suggested, should form a protective covering.

Packing.

Use dead skins or damaged skins as a protective covering on the outside of each bundle—top and bottom—and then pack in the following way:—

Merino skins.—These skins, because of their weight and size, cannot be successfully handled unless they are folded. They should be folded wool to wool, because the cushion formed by the wool prevents the skin from cracking. Fold down the centre of the back

and pack head-tail, tail-head, placing the fold of each successive skin on the opposite side of the bundle to make a neat square parcel. The sides of each skin should be placed about 4 in. over the fold of the skin immediately below so as to form an additional protective covering (Fig. 4). The dead or damaged skins used as a protective covering should be placed flatskin outside, one on top and one at the bottom of each bundle. When the bundle is tied, the sides of these skins are folded against the bundle to act as a further protection. Tie as tightly as possible with a rope, once along the length of the bundle and three times across (Fig. 5). Wire should not be used. Most brokers will supply old rope free on application.

Persian, Cape and Boer goat.—These skins should not be folded but packed flat hair to hair. Their sole value lies in the pelt itself and the grain or hair side must be well protected. Merino and Crossbred shearlings (short shorn skins) should be packed in similar manner.

Stencil the initials of the consignor, consignee, number of bale, code mark or number of receiving and despatching stations on a piece of old sacking and insert this under the tie ropes (Fig. 6).

Black Quarter :—

[Continued from page 522.]

to black-quarter organisms getting into shearing wounds and setting up a gas gangrene condition. Affected sheep do not show marked changes in the muscles of the quarters, but show reddish black to reddish green swellings round the wounds. These swellings are hot and painful, and the affected sheep shows very marked symptoms of fever, dullness, etc., usually dying in two or three days in a state of coma.

To prevent this condition, which often occurs on farms where black quarter in cattle is rare or does not occur, the sheep should be inoculated with black-quarter vaccine about two to three weeks before shearing. Disinfection of shearing sheds and shearing instruments should be carried out, but is often difficult, and shearers will usually resent their instruments being boiled or disinfected in other ways.

It should be mentioned that, in the inoculation of cattle and sheep with any kind of vaccine, proper sterilization of the syringe and needles must be undertaken and a freshly sterilized needle used for each animal. If this is not done, it may happen that, just as black quarter bacteria may get into shearing wounds, they may also get into inoculation skin punctures and set up black quarter. Losses have occurred from black quarter after inoculation with anthrax, blue-tongue and other vaccines, and it has been shown that the organisms were not in the vaccine itself.

To prevent and control black quarter is then mainly a question of regular annual inoculation in the case of cattle. In the case of sheep, inoculation before shearing as a precautionary measure should be undertaken where it is known that fatalities may occur when animals are shorn.

The Density of Milk.

S. Bakalor, Agricultural Research Institute, Pretoria.

SPECIFIC gravity is the physical property most commonly determined in the routine examination of local milk supplies, as from this determination and the fat test it is possible to estimate, by means of the well-known Richmond's formula, the total solids and solids-not-fat content of milk to a degree sufficiently accurate for general milk-plant or milk-recording purposes. Determining the specific gravity (S.G.) of samples by means of the lactometer (or milk hydrometer) is a simple and rapid procedure, and if followed by confirmatory tests, can assist in detecting watered or partly skimmed supplies.

Within the last ten years dairy laboratories in Great Britain have largely discarded the S.G. determination on milk samples in favour of the determination of density.* This is due to the findings of the British Standards Institution, which in 1937 issued a British Standard Specification (B.S.S. 734) for density hydrometers for use in milk. This specification brings milk hydrometers into line with hydrometers specified for general use by this institution, which considers density to be a more satisfactory basis for hydrometry than S.G. The B.S.S. milk hydrometer has the further advantage over the lactometer in that it is calibrated to read density at a temperature of 68° F. (20° C.), which is very near to the temperature (70° F.) specified for the Babcock and Gerber fat tests. The fat test is usually performed immediately after the density or S.G. determination. When a lactometer is used, milk samples have to be cooled to a temperature near 60° F., and have then to be warmed again to 70° F. for the fat test. This delays work in the test-room.

The B.S.S. hydrometer is made in three sizes. A 200-ml. (7 fluid ozs.) sample is sufficient for use with size I, whereas only 130 ml. (4½ fluid ozs.) and 57 ml. (2 fluid ozs.) are required for sizes II and III, respectively. The two smaller sizes make it possible to obtain a reading on samples which would be too small for the standard S.G. lactometer. A disadvantage of the B.S.S. hydrometer is, however, the fragility of the stem.

The relationship between the S.G. at 60° F. (15.5° C.) and density (D) at 68° F. (20° C.) of a milk sample is given by the following equation (F = per cent. fat):—

$$\text{S.G.} = D + 0.00205 + 0.00005 F,$$

i.e. for milks of average fat content (between 3 per cent. and 4 per cent),

$$\text{S.G.} = D + 0.0022.$$

A modification of the original Richmond's formula, based on density instead of S.G., is given in B.S.S. 734.† This booklet should be consulted for more information on the use of the hydrometer, as well as for corrections to be applied to readings taken at temperatures just above or below 20° C. (68° F.).

During the last three years a large number of milk samples have been analyzed at the Agricultural Research Institute (Dairy

* The density of milk at any particular temperature is its mass per unit volume at that temperature.

The S.G. of milk is the ratio of the density of milk at a particular temperature to the density of water at the same temperature.

† The B.S.S. formula is:—

$$T = 0.25D + 1.21F + 0.66 \text{ [where } T = \% \text{ total solids, } D = 1000 \text{ (density reading at } 68^\circ \text{ F. - 1), and } F = \% \text{ fat].}$$

This modified formula has the same degree of accuracy as the original Richmonds' formula.

Section) in connection with the current investigations on the chemical composition of local milk supplies. The densities of nearly all these samples were also recorded (although not for the purpose of estimating the S.N.F. content). In an investigation conducted between August 1943 and May 1944, altogether 1,257 samples of milk were taken from 34 Pretoria milk-depots. In a second study (between August 1944 and July 1945), 1,608 samples of milk sent by producers to a city milk plant were analyzed. The densities of all the 1943-44 samples and of 1,536 of the 1944-45 samples were recorded. The mean results of these determinations are given below:—

TABLE I.—*Mean densities at 20° C. (68° F.) of samples*

No. of Samples.	Period.	Mean Density.	Range.
1257	1943-1944	1.0288	Below 1.0250 to 1.0323.
1536	1944-1945	1.0287	Below 1.0250 to 1.0323.

Of the 1943-1944 samples, 75 per cent. tested between 1.0275 and 1.0299; while 88 per cent. of the 1944-45 samples fell between these limits. It can thus be seen that the density of local milk supplies varies only to a small extent. The mean densities given above are equivalent to specific gravities (at 60° F.) of 1.0310 and 1.0309. These results are slightly lower than the mean S.G. of 1.0320 given by Davies (1939) for milk in Great Britain. The S.N.F. constituents in milk tend to increase the S.G. or density of the product, and, as South African milk supplies are known to be lower in S.N.F. than those of Great Britain, the lower density of local milks was to be expected.

The monthly variations in the density of the milk samples are given in Table II.

TABLE II.—*Monthly variations in the density of milk.*

Month.	MEAN DENSITY. at 20° C. (68° F.)	
	1943-1944.	1944-1945.
August.....	1.0284	1.0285
September.....	1.0286	1.0290
October.....	1.0288	1.0288
November.....	1.0288	1.0293
December.....	1.0288	1.0288
January.....	1.0286	1.0288
February.....	1.0285	1.0284
March.....	1.0286	1.0281
April.....	1.0286	1.0285
May.....	1.0286	1.0286
June.....	—	1.0286
July.....	—	1.0290

The density of a complex substance such as milk is an additive property, being influenced by the densities of the various constituents, according to the proportions in which they are present. The density of the S.N.F. constituents is higher than, and that of milk-fat lower than, the density of water. The mean fat content of the milk supplies examined was found to be lowest in spring and summer, and highest in mid-winter. The S.N.F., ash and lactose

What we Know About D.D.T.

Dr. Bernard Smit and B. K. Petty, Division of Entomology.

WE have only just begun to investigate D.D.T. in South Africa and we must remember that this substance is only a beginning on the road to the discovery of many similar organic insecticides which will probably be even more effective against insect pests. Many people now feel that this "wonder insect killer" is not as wonderful as they had expected it to be. Indeed, they have gone from the one extreme of expecting too much to the other extreme of expecting too little and almost condemning it altogether.

There is no doubt that D.D.T. is a most effective insecticide, but it must be used in the right way against those insects which are susceptible to it. It has been found that organic insecticides are surprisingly specific in their action and even for the same insect they will sometimes kill it in a certain stage of its development, but not in another. For instance, D.D.T. will very readily kill such insects as C.M.R. beetles, but not cockroaches and locusts, and in the case of the army worm it will kill the caterpillars in their first four stages or instars, but not those that are more fully developed. As there are hundreds of different insect pests in South Africa, each will have to be tested separately for its susceptibility to D.D.T., and it can easily be imagined what a tremendous amount of research work there is still to do on this problem.

Formulations.

D.D.T. can be used in various forms and in various ways, and it has been found that results vary greatly according to the way in which it is applied. The product, as it is first manufactured, is a greasy, sticky, white powder containing 70 per cent. of the actual active ingredient, the para para compound, but this is not suitable for use as such. It is not soluble in water but will readily dissolve in mineral oils, vegetable oils and the usual organic solvents. Some oils can be emulsified after the D.D.T. has been dissolved in them, and so emulsions can be formed. Too little is known about the effect of emulsions on plants to recommend their general use for agricultural pests at present, although they are known to be more effective against certain pests such as aphids and red mites than dusts or water suspensions. The D.D.T. can be mixed with certain inert powders such as talc, china clay and gypsum and then ground to a very fine powder. This powder can be used directly against some insects, or it can be mixed with water to form suspensions which are then used as sprays. If D.D.T. is dissolved in alcohol and this solution is then thrown into water, a very fine suspension is formed which is effective in certain cases.

To make the talc powder mix more readily with water, a wetting agent is often used. One such wetting agent is sodium lauryl sulphate which is added at the rate of 2 parts by volume to 5 parts of D.D.T. powder. The powders should first be made into a paste with a little water and then sufficient water is added to make a spray of the required strength. Water suspensions can best be made up with powders containing 20 to 50 per cent. D.D.T. For some insects a final concentration of 1 per cent. of actual D.D.T. in the spray mixture is effective. When such suspensions are used, they should be constantly agitated while being sprayed.

Aerosols.

Much has been heard of aerosols lately for the killing of flying insects such as house-flies and mosquitoes. The principle of an aerosol is as follows. When a solution of an insecticide such as D.D.T. is dissolved in a volatile solvent and sprayed into the air, the solvent or carrier evaporates almost immediately, leaving very tiny particles of the insecticide floating in the air. The insecticide may be a non-volatile liquid such as pyrethrum extract, so that in this case, when the solvent has evaporated, small drops of the active ingredient are left in the air. This forms a mist or fog and when insects fly through it they come into contact with the tiny particles of poison and are killed. For household insects a mixture of D.D.T. and pyrethrum in an aerosol solution makes an ideal combination because the tiny drops of the pyrethrum extract containing D.D.T. stick well to the bodies of the insects flying through them. The pyrethrum gives a quick "knock down" and the D.D.T. prevents the insects from recovering again. The usual solvent for aerosols is freon, the refrigerant commonly used in refrigerators.

In discussing the use of D.D.T. we should distinguish between what are called "space sprays" and "residual sprays." Space sprays, like aerosols and the usual fly sprays, are blown into the air in enclosed spaces like rooms of houses to kill flying insects and are active only while they remain suspended in the air as a mist or fog. They are not satisfactory for producing effective persistent residues. In closed rooms these fogs may persist and remain active for several hours. Residual sprays, on the other hand, are applied to surfaces in order to render such surfaces toxic to insects that walk over them. One of the great advantages of D.D.T. is its persistent residual effect, and it has been found, for instance, that a wall sprayed with the usual 5 per cent. solution of D.D.T. in paraffin will remain deadly to bedbugs for almost a year afterwards. The solution should just wet the walls thoroughly and not run down them. In general 1 quart of 5 per cent. D.D.T. solution applied to 300 square feet of surface gives an adequate deposit of D.D.T. crystals, although on finished surfaces it may be desirable to apply somewhat less if there is a tendency for the material to run.

Insect-killing Smokes.

Strangely enough, D.D.T. does not decompose when volatilized by heat and it has been found that it can be disseminated on the very fine particles of smoke. If D.D.T. is dissolved in an oil and the oil burned with too little air so as to give a thick black smoke, the insecticide is carried into the air in a very finely divided and active form. It may also be mixed with certain solid materials, and, when these are burned, a similar toxic smoke is produced. These smokes may be objectionable to use in houses, but in storerooms and warehouses they may perhaps prove very useful.

Ointments.

D.D.T. can be mixed with vaseline or fatty substances to form ointments which are useful against such pests as blowflies on sheep and hornflies on cattle.

All these different mixtures are called formulations and they will, no doubt, be improved as our research work continues. In most cases D.D.T. acts best as a contact insecticide, although, if ingested by insects, it is also a very good stomach poison. It must be

remembered that, in order to kill the insects, it must be put where it will come into contact with them. For instance, when used against flies in a house, it must be sprayed on to walls, windows or other surfaces where flies will walk over it. It is no use spraying it into dark corners where flies do not go. On the other hand, if it is being used for bedbugs, it is just the dark corners and crevices around the beds that should be sprayed.

As far as our knowledge goes at present, D.D.T. may be regarded mainly as an insecticide for household insects.

Varying Results.

It must be remembered that D.D.T. is rather slow in its action and does not bring down flies at once as pyrethrum does. Once an insect is affected, however, it never recovers, as far as our experiments have shown. The dry powders are not as active as the solutions in killing insects, and we have been disappointed in their effects on ants and cockroaches. Suspensions in water are in general not as active as solutions. Recent experiments in our laboratory have shown that the results on insects with residual sprays may vary according to the surface to which the D.D.T. is applied. In testing the residual effects, it was found that, in order to give the same mortality, a glass surface requires about one-quarter the dosage required on plain unpainted wood, raw plaster, distemper, stone and wood painted several years previously. Wood painted with either enamel flat or oil paints or oil stains and allowed to dry for a month before the D.D.T. spray was applied, caused very low mortalities even though the application of the spray was heavy. Apparently the paint reacted with it in some way and reduced its toxicity. To kill insects, D.D.T. must come into intimate contact with them and to accomplish this we find some solvents better than others.

Effect on Beneficial Insects.

Insect parasites of pests, particularly agricultural pests, do far more good than most people realize, and in some cases keep the pests under control for several years between outbreaks. The introduction and use of beneficial parasites is the only method of controlling some pest insects and this method has been used with ever-increasing success in recent years. The beneficial parasites belong mostly to the order of insects called *Hymenoptera*, which includes the bees and wasps, and unfortunately they are very susceptible to D.D.T. For use on agricultural pests such as codling moth, aphids and cabbage caterpillars, D.D.T. should not, therefore, be used for the present. Owing to the involved nature of these insect problems, it will be some years before we know enough about them to say just how and when D.D.T. should be used, or whether it is safe to use it at all. There are already reports of its use on aphids (green-fly) in which the natural enemies of this pest, the ladybird beetles, were killed, but not the aphids themselves, so that after a few weeks the pest was much worse than it had been initially.

Possible Dangers.

The other big question in regard to D.D.T. is its possible toxic effect on human beings and domestic animals, and this cannot be answered without much careful research work and many observations over a long period. There have been alarming stories circulating about cases of poisoning in children, but the more we know about this subject, the less inclined we are to fear serious results.

There was a case described in the *British Medical Journal* of a laboratory assistant who suffered from nervous disorders for a long time after mixing a D.D.T. solution in acetone with his hands, and there was an account of a child in West Africa who had died after eating some D.D.T. with its food.

We know that people differ enormously in their susceptibility to all poisons and in such cases there might have been some predisposing factor. Possibly in the first case the acetone (duco thinners), which is a very active solvent, may have had something to do with the matter. At the C.D. factory at North Rand where hundreds of tons of D.D.T. have been made and where many men have been in daily contact with the material for over a year, not a single case of D.D.T. poisoning has been noticed, although the Medical Officer there has been making careful observations.

In an American publication there was an account of D.D.T. being fed to cows and the material then passed into the milk of the cows and, when fed to rats, this milk proved toxic to them. In order to verify this, five cows at Onderstepoort were fed excessive doses of D.D.T. with their lucerne hay, but no ill-effects were noted by the veterinary officers, either in the cows or in the rats which were fed on their milk. In other countries a great many experiments have been carried out either by feeding the material to animals or applying it to the skin, or allowing people to inhale the aerosol fumes. On the whole, it has proved remarkably safe to use. The safest formulation is the dry D.D.T.-talc powder mixture which has been used in such great quantities in clothing and against the skin for the control of human lice and typhus fever. As regards solutions, all ordinary precautions should be taken. The solutions in vegetable oils are said to be more dangerous than those in mineral oils. Care must be taken not to get the material into foodstuffs, for we must still regard D.D.T. as a poison.

There is some evidence that plants of the cucurbit family such as cucumbers and squashes may be adversely affected by the application of D.D.T. insecticides, and the growth of tomatoes and beans may be retarded by its use. Those engaged in field work should therefore watch carefully for any indications of plant injury such as stunting, or effects on quality and yield, which may be attributable to the use of D.D.T.

Encouraging Results and Specific Recommendations.

It must be remembered that the recommendations here given are tentative, but from the results of our investigations the following advice in regard to the the use of D.D.T. can now be given:—

Household Insects.

1. For house-flies in houses use space sprays containing D.D.T. dissolved in paraffin with pyrethrum or thiocyanonates added for a quick knock-down and residual sprays of higher D.D.T. concentration of about 5 per cent. without the quick-acting insecticides on surfaces where flies will cluster.

2. For fleas on dirt or dusty floors, use a space spray with quick-acting ingredients, but to kill fleas and their larvae on solid floors

use a residual spray. For fleas in clothing and bedding, the 5 per cent. D.D.T. powder can also be used.

3. For mosquitoes in houses use a space spray as for house-flies. On screening and walls a residual spray is often very effective. Breeding places such as stagnant pools, water in roof gutters, etc., should be sprayed with a 5 per cent. oil solution. Emulsions and water suspensions have also given good results.

4. For clothes moths use a 5 per cent. residual spray on both sides of infested cloth and the inside of infested cupboards. This will kill moths and feeding caterpillars and protect cloths.

5. For fish moths (silver fish) use a 5 per cent. residual spray in infested cupboards and on bookshelves.

6. For blood-sucking lice use 5 per cent. powder well dusted into underclothing and into the hair. The powder can safely be used against the skin.

7. For bedbugs use a 5 per cent. or 10 per cent. residual spray of straight D.D.T. dissolved in paraffin or a mixture of paraffin and white spirit. Spray to wet the walls where the bugs walk at night.

8. In our present formulations D.D.T. is not very toxic to ants, but the 5 per cent. solution acts as a good repellent.

9. D.D.T. is toxic to termites but methods of applying it are still being investigated.

Agricultural Pests.

10. For lice on animals use 5 per cent. powder rubbed, or a suspension sprayed, into the hair.

11. The same applies for stable-flies, hornflies and fleas. An ointment can also be used.

12. For sheep blowflies, emulsions and D.D.T. ointments are very effective in protecting the sheep from strikes.

13. For bagrada bugs in cabbages, cauliflowers, stocks and all cruciferous plants, dust with 5 per cent. powder.

14. Use the same for *Astylus* beetles and C.M.R. beetles on garden plants.

15. For the maize stalk-borer top-dress infested plants with 2½ per cent. dust when they are about 2 feet high.

16. For army worm dust infested crops with 5 per cent. powder before the worms have reached the fourth stage (about an inch long) in their development. The later stages are resistant to D.D.T., and other insecticides such as cryolite should be used.

For locusts and cockroaches, wattle bagworm and aphids our present formulations are not very effective. D.D.T. has proved no more effective than the standard pyrethrum dusts against wattle jassids and capsids, while as a soil insecticide against larvae of the citrus snout beetle it failed to give satisfactory control, but further research may improve matters in this respect.

Paraffin and oil solutions of D.D.T. should not be used on living plants or animals.

Care should be taken that D.D.T. is not swallowed, or sprayed on to food. Normally this substance is very stable, but it decomposes and loses its strength when exposed to direct sunlight. On lime-washed walls the lime also reacts with it and slowly reduces its toxicity.

The Density of Milk :—

[Continued from page 532.]

contents were highest in November (1944) and December (1943), and lowest in the months July to October. It is to be expected that these changes in composition would be reflected in the monthly fluctuations in density. The highest mean monthly density was found in November (1944) but the varying amounts of the different constituents did not generally cause any marked variation in density.

The constituent causing the density to fall (i.e. fat) is to some extent balanced by the constituents causing density to rise (i.e. ash, protein and lactose). For example, in the 1944-45 survey, morning milk was found to be on an average 0.11 per cent. higher in S.N.F., and 0.13 per cent. lower in fat, than milk drawn in the evening. The mean densities for these morning and evening milks were 1.0289 and 1.0285, respectively, the difference between these two values being insignificant.

REFERENCES.

- (1) BRITISH STANDARDS INSTITUTION (1937). British Standard Specification for Density Hydrometers for use in Milk (B.S.S. 734).
 - (2) W. L. DAVIES (1939). The Chemistry of Milk (2nd Edition). Chapman and Hall, Ltd. London.
-

A Laying Battery for Poultry in Towns.

G. C. van Drimmelen, Government Veterinary Officer,
Bloemfontein.

INCREASED knowledge of nutrition and improved methods of poultry housing have contributed as much to the breeding of fowls for high egg production as careful selection for laying qualities.

The battery system is one of the finest achievements in the development of housing. In the United States of America more than forty million hens are housed according to the battery system to-day as compared with the few thousand of fourteen years ago. The difference between a hen in a pen and one in a battery is much smaller than that between a hen on free range and one in an ordinary run. Ample food, a favourable climate and "elbow room" provide ideal conditions for laying.

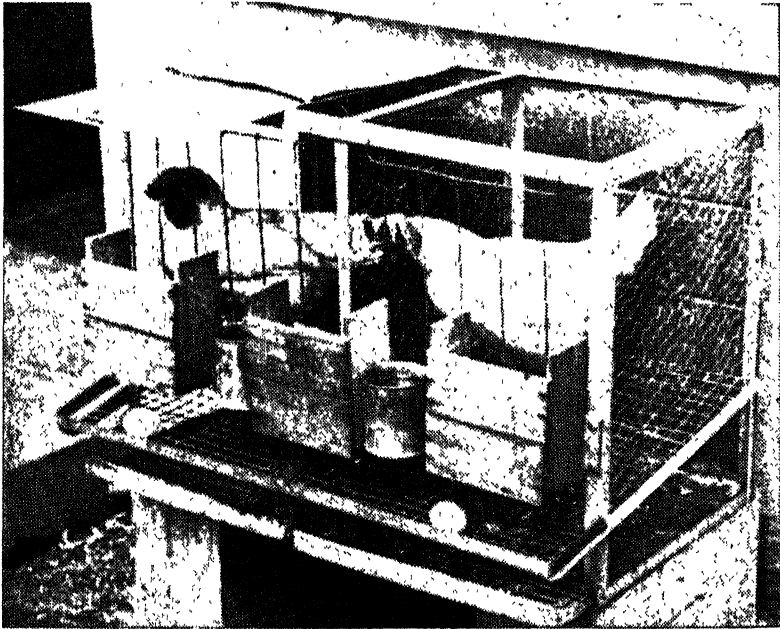


Fig. 1.—A home-made double-compartment laying battery.

Unfortunately in towns, our hens are far too frequently housed under conditions which are detrimental to egg production, the owners themselves being quite indifferent to the matter. There are disadvantages attached to a complete change-over to the battery system, but townspeople desirous of obtaining half a dozen or more eggs per day and in time of extreme meat shortage, a table bird, will find that this system has very special advantages too.

For the education of urban youth the battery system offers a practical method of studying biology and food production and of developing a keen power of observation.

The laying battery consists of separate chambers of 18 in. by 18 in. by 18 in. for each hen. The birds stand on wire mesh (1½ in. holes) through which the droppings fall into a removable tray. The mesh is fitted at an angle so that the eggs can roll down to the front. Feed, shell grit, green feed and water are provided in hoppers fitted to the front of the chamber to facilitate handling. A considerable saving of space is effected by stacking the chambers close together in tiers, and the use of iron coops obviates the danger of parasites.

Advantages of the Battery System.

The advantages of the battery system for those living in urban areas are briefly as follows:—

(1) A good record can be kept of the egg production of each individual hen. (Many hens kept in towns do not even lay 100 eggs per year.)

(2) A better study can be made of the individual characteristics of hens.

(3) The work in connection with the care of the hens is facilitated and in this way time can be saved.

(4) An appreciable saving of space is effected and the surroundings can be kept neat and hygienic.

(5) The food consumption is more economical since food scraps can be used for the production of eggs and table birds.

(6) Breeding places for internal parasites and some infectious diseases are eliminated.

(7) External parasites can be more easily controlled.

If the system is applied exclusively for purposes of food production (eggs and meat), pullets are placed in the chambers in February. At this time eggs are expensive and poor producers can be killed in good time and replaced by others. High producers usually begin laying fairly early. Early moulters usually moult while eggs are still fairly plentiful. These hens should be slaughtered immediately and replaced temporarily by pullets which were hatched very early. Raising chickens is a difficult task in towns and for this reason it is more economical to buy pullets. It is not always necessary to use purebred fowls for egg production and the breed used is a matter of choice.

Food scraps can be used very effectively if prepared in the correct way. Vegetable scraps should be chopped fine and pieces of bread and porridge should be dried, ground and fed regularly in small quantities. Sudden changes in the composition of the ration may have an adverse effect on egg production. Codliver oil should be administered in cases where hens get less than twenty minutes of direct sunlight per day. Since the system is very clean, however, the battery can easily be kept in any house, on a stoep, or in an outhouse, garage or shed which gets half an hour's sunlight per day. Hens sometimes lay eggs without shells or with very weak shells and then they are inclined to break and eat them. In open fowl runs such eggs are seldom noticed, since they are not usually laid in the nest, but in the battery all broken or soft eggs will be detected and it will be possible to get a good idea of every hen's laying capacity.

A Home-made Design.

Batteries are very expensive in South Africa today and for the time being a home-made design which has been used with great success during the past five years by the writer and others, can be recommended.

A LAYING BATTERY FOR POULTRY IN TOWNS.

The accompanying photo of a home-made battery shows how it works. The hoppers should be about 6 in. deep to prevent wastage of mash and should be placed as far as possible from the water,

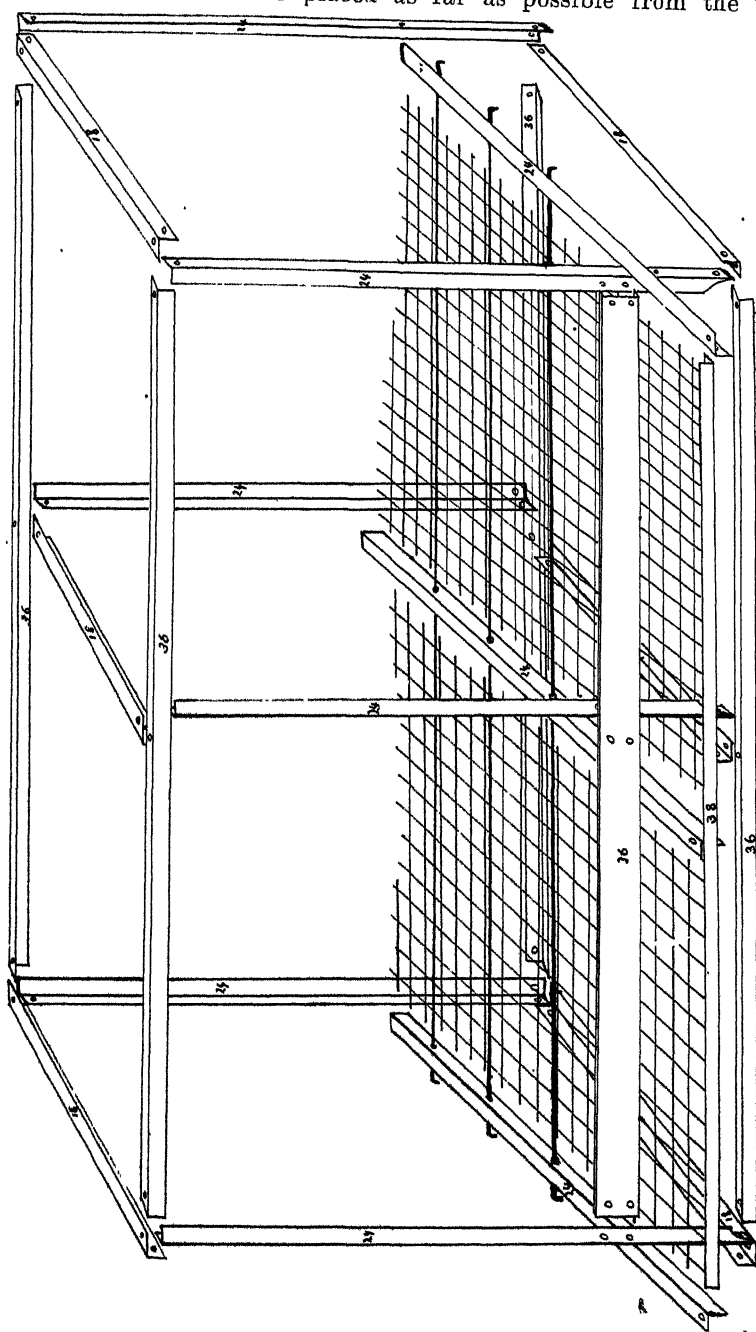


FIG. 2.—Diagram of double-compartment battery.

i.e. hoppers for green feed and grit should be placed in between. The sides are closed in with ordinary gauze wire. The front is closed in with a smooth wire frame through which the hen can

D.D.T. for the Protection of Sheep against Blowfly.

R. du Toit, Division of Veterinary Services, Onderstepoort.

ONE of the main scourges to which the present-day high-producing woolled sheep is subject, is undoubtedly the skin infestation brought about by maggots of the various species of blowflies which, if neglected, rapidly proves fatal. Of these blowflies the worst offender is the green blowfly, *Lucilia cuprina*, which recent work, both in Australia and South Africa, has shown to have so adapted itself in its larval stages to a parasitic form of existence, that it breeds almost exclusively on living sheep. Any campaign directed against this species must, therefore, aim at preventing the development of maggots on the living sheep by destroying them before they have reached maturity and dropped to the ground where they would pupate to produce adults capable of reproducing themselves in very large numbers. This control of the larval stages may be effectively accomplished by the use of the blowfly spray produced at Onderstepoort, but in order to attain any measure of success bi-weekly inspections of sheep during the summer months should be made and all infected animals treated. Considerable labour is involved in such an undertaking, and, unless the method is applied generally sufficient flies will escape to ensure the continuation of the pest.

Another and more effective way of tackling the problem is the protection of sheep against blowfly strike, and in this respect a powerful weapon has been discovered in D.D.T. with which extensive field trials in blowfly areas have been conducted. This insecticide has been found to be almost entirely ineffective against the third stage or mature larva, which precludes its use as a dressing for sheep already infested, but it is extremely lethal to the first-stage larvae just after they have hatched from the eggs. There is also evidence to show that it may even prevent the eggs from hatching.

D.D.T. is a very stable compound which is insoluble in water but soluble in various oils and organic solvents. In the wool of sheep it has been found to remain effective for considerable periods where it is probably taken into partial solution by the wool grease which prevents its being washed out by rain, and holds it closely attached to the wool fibres.

The Application of D.D.T. to Sheep.

To obtain maximum efficiency D.D.T. should be applied in solution, but as the solvents most suitable are generally too irritating when applied to the skin, it has been found that solutions emulsified with water are harmless to apply and at the same time very effective. Such emulsions or emulsifiable oils capable of being diluted with water are available and should be applied as follows.

The type of spray pump is a matter of choice, but the ordinary stirrup-type double-action pump, commonly referred to as the locust pump in the Union, is eminently suitable and generally easily obtainable. This pump is capable of exerting considerable pressure on the spray fluid, which is essential, as it should be driven down to the skin. The usual Bordeaux-type nozzle with which these pumps are fitted has been found rather too wasteful of the fluid and the Vermorrel or Fembre-type nozzles give much better results.

A type of nozzle which can readily be turned out of brass and which has given excellent results in the field, is illustrated in Fig. 1.

This is used in conjunction with a spring-release hand-operated valve (2) fitted to the tubing (1) of the stirrup pump. The lance or metal tube (3) connecting the valve with the actual nozzle should be short, about 4 inches, to make the apparatus more easily handled

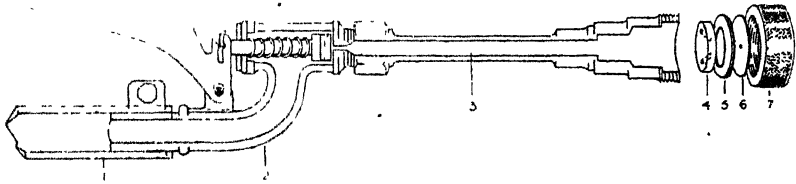


FIG. 1.—A nozzle turned out of brass.

and prevent fatigue on the part of the operator. The nozzle consists of the following parts:—a brass disc with two holes of $\frac{1}{16}$ in. diameter drilled through it at opposite angles to each other so as to impart a twist or circular motion to the fluid, a leather washer or distance piece (5), a brass or stainless steel disc with a central pin-hole of about $\frac{1}{16}$ in. diameter (6), and a screw cap (7) with a shoulder in front to hold the various parts together.

The operation of spraying is best performed in a narrow opening in a wall or in the gate of a kraal as illustrated in Fig. 2. It is advisable to shear the wool around the root of the tail and on the inner aspect of the hind legs down to the hocks, but make sure that all soiled locks of wool are removed. This promotes penetration of the spray and prevents wastage. Uncrutchd sheep can be sprayed,

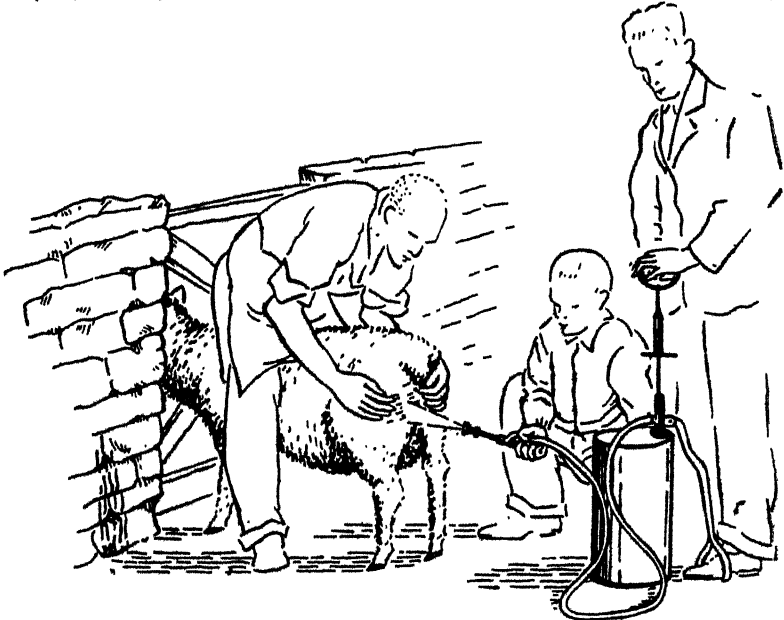


FIG. 2.—How the sheep is held and sprayed.

however, but during spraying it is necessary for the assistant holding the sheep to open the wool with the fingers to ensure penetration of the spray to the skin. Spraying must include the wool right around the root of the tail and on the hind aspect of each leg down to the hocks together with the wool present in the crutch. Rams may also be sprayed over the top of the head and between each horn

and the head. Hamels showing any tendency towards soiling of wool around the sheath should be sprayed in this situation as well.

The experience gained to date indicates that a very high degree of protection against blowfly strike is afforded for a period of approximately three months.

The emulsion spray produced by the Government C.D. factory under the name of Grenade V Brand Emulsifying Liquid and diluted according to directions with 3 parts of water to give a final dilution containing 5 per cent. of active D.D.T. will be found to be very economical in use. One gallon of the concentrated fluid is sufficient to spray effectively approximately 100 sheep, which represents an amount of slightly less than $6\frac{1}{2}$ fluid ounces of the diluted spray for each sheep.

The best time to treat sheep is just after the first summer rains prior to the onset of the first wave of blowfly activity which generally takes place in September or October. The treatment is usually sufficient to protect sheep against strike until blowfly activity has subsided, this generally occurring during December in normal seasons. The treatment should be repeated just after the late summer rains to protect the sheep against the second wave of blowfly activity which generally occurs in February. This second treatment should be sufficient to safeguard the animals until blowfly activity has subsided with the advent of winter.

It must be emphasised that this spray should not be used for the treatment of sheep already struck, as D.D.T. has practically no effect upon the full grown larvae. Such struck sheep should be treated with the blowfly spray produced by Onderstepoort in order to kill the maggots, and thereafter the struck area may be treated with D.D.T. emulsion in order to ensure protection against re-strike.

A Laying Battery for Poultry in Towns :—

[Continued from page 541.]

easily poke her head to eat, and which can be turned up. Any washable material can be used for the back, roof and droppings tray. Two 4 gallon paraffin tins flattened out and joined together after the lids and bottoms have been removed, will be just large enough to make the back, roof or two droppings trays for one laying battery with 2 compartments.

In figure 2 an illustration is given of the framework of such a home-made double-compartment battery. The frame is made from galvanized sheet iron (no. 8 gauge) bent to a rectangular shape and put together with ordinary galvanized bolts or rivets ($\frac{1}{4}$ in. as used for galvanized-iron dams).

All the bars are 1 in. wide along both sides with the exception of the front bar and the one from which the feed hoppers and water troughs are hung. The latter are three inches wide with bent $\frac{1}{4}$ in. edges. The floor is made from firm screening wire with 1 in. to $1\frac{1}{2}$ in. mesh; it rests on the front bar and lengthwise on 3 smooth wire reinforcements (no. 9 gauge). The slope is about one in six. The numbers on the bars indicate the length in inches.

Oats and Wheat as Grazing for High Producing Cows.

W. A. Verbeek, Animal Husbandry Research Officer, Vaalhartz Experiment Station.

IN their early stages of growth oats and wheat have a very high nutritive value, and dairy farmers would be well advised to use these crops as far as possible for grazing purposes during the winter months. The general shortage of concentrates in the country is a serious obstacle in the way of milk production and has caused a milk shortage in all the larger centres in the Union. Unless steps are taken to provide the necessary supplementary feed, this shortage will undoubtedly become more severe during the winter months when the nutritive value of the natural grazing is very low. A high milk production can be obtained without supplementary concentrates if oats or wheat pasturage is effectively utilized and supplemented. At the Vaalhartz Experiment Station both oats and wheat (mainly Algiers oats and Red Egyptian wheat) are used as grazing for dairy cows, and experiments carried out at this station have produced valuable information which may prove very useful to farmers who are desirous of using these pasturages to the best advantage.

Results of Experiments.

The results obtained from a few experiments with Friesland cows, are summarized below.

Experiment No. 1.—A comparison was made between two groups of cows which received the following treatments. The treatments were changed over after a period of 15 days.

(a) 23 lb. lucerne per cow per day + 4 hours' oats grazing per day.

(b) 23 lb. lucerne per cow per day + concentrates, according to the production level. The concentrates consisted of maize meal, soybean meal, groundnut meal and bran.

In both rations the 23 lb. of lucerne hay represented sufficient food constituents for the maintenance of a cow, plus a production of 10 lb. of milk. The oats grazing and concentrates were therefore respectively responsible for the *extra production* yielded by the cows in the two groups as reflected in the table below.

GROUPS.	Average milk production per cow per day.	Average concentrates consumption per cow per day.
GROUP 1.		
Treatment (a) (first period).....	29.5 lb.	None.
Treatment (b) (second period).....	24.7 lb.	4.76 lb.
GROUP 2.		
Treatment (a) (second period).....	26.5 lb.	None.
Treatment (b) (first period).....	23.9 lb.	4.70 lb.

A higher production was obtained with oats grazing, and the production level obtained on oats grazing could not be maintained with the concentrates.

Experiment No. 2.—Wheat pasturage was used in an experiment with two groups of cows receiving the following treatments which were changed over after a period of 15 days.

(a) 20 lb. of lucerne hay per cow per day + 4 hours' wheat grazing per day.

(b) 20 lb. of lucerne hay per cow per day + maize-ear meal according to the production level.

The average milk production and concentrates consumption per cow per day is given below.

GROUPS.	Milk production.	Concentrates.
GROUP 1.		
Treatment (a) (first period).....	29.2 lb.	None.
Treatment (b) (second period).....	25.4 lb.	7.7 lb.
GROUP 2.		
Treatment (a) (second period).....	28.6 lb.	None.
Treatment (b) (first period).....	26.5 lb.	7.4 lb.

In this case, too, it was impossible to maintain the production level obtained with wheat grazing, with maize-ear meal. As in the case of oats grazing, wheat grazing also gave a considerable impetus to milk production.

Experiment No. 3.—Two groups of 4 cows each received the following treatment for a period of 25 days (from 18 July):—

(a) One hour's oats grazing per day + lucerne hay *ad lib**.

(b) Four hours' oats grazing per day + lucerne hay *ad lib**.

The average milk production of the two groups of cows (i) during the 10 days before the experiment was started and (ii) during the experiment, and the average daily lucerne hay consumption, are given below.

	Treatment (a).	Treatment (b).
Average daily milk production—		
(i) Before experiment was started.....	30.5 lb.	27.2 lb.
(ii) During experiment.....	30.9 lb.	28.6 lb.
Average daily lucerne hay consumption.....	25.1 lb.	20.3 lb.

The two highest producers of each group yielded the following average production per day.

	Treatment (a).	Treatment (b).
Average daily milk production—		
(i) before experiment was started.....	33.7 lb.	37.8 lb.
(ii) during experiment.....	34.3 lb.	39.4 lb.
Lucerne-hay consumption.....	23.4 lb.	21 0 lb.

* As much as the animals would eat.

In addition to improving or maintaining their production levels, all the cows gained weight during this period.

After a further period of 19 days on oats and wheat grazing the cows still maintained their production and showed a live-weight increase under the same treatments, but during the following 35 days their milk production gradually fell. This decline in production set in at the beginning of September.

Discussion of Results.

The results of the above experiments show that milk production is considerably stimulated by oats and wheat grazing and that if these crops are used, little or no concentrates will be required until the end of August.

To derive the greatest benefit from these crops they should be grazed in their early stages of growth, i.e. when the plants are about 8 to 10 inches high. At this stage the crops have a very high nutritive value and the plants recover quickly after having been grazed. In the advanced stages of growth, i.e., the piping stage, both the nutritive value and the powers of recovery are lower and consequently fewer grazings are obtained per season. During September and October when the winter cereals mature rapidly, their nutritive value as grazing also falls considerably and the production cannot be maintained at the same level as during the early stages of growth as shown by these experiments.

To obtain the highest pasturage production, careful control of oats and wheat grazing is essential. This is possible if use is made of temporary fences and care is taken that the same area is not grazed continuously for more than 7 days at a time. For complete and rapid recovery after having been grazed, the pasturage will need a period of complete rest. At the Vaalhartz Experiment Station it was found that one morgen of oats or wheat with a good stand and vigour (8 to 10 inches high) would yield sufficient grazing for 25 to 30 Friesland cows for a period of 7 days if the animals graze for 2 to 4 hours per day and in addition receive lucerne hay in the kraal.

It was found at this station that, with careful control, it is possible to obtain 5 to 6 such grazings per season from oats.

It is highly advisable to limit the duration of the daily grazing periods in order to obviate unnecessary trampling or wastage of these valuable grazings. The duration of such grazings should be determined by the amount of grazing available, the milk production of the cows and the amount and quality of the supplementary feed given to the cows. The abovementioned experiments showed that a daily production of almost 4 gallons of milk could be maintained with cows which grazed for 4 hours per day and received 20 lb. of lucerne hay per cow per day. Cows with a higher production may be allowed longer grazing periods, e.g., as long as 8 hours a day, and lower producers may be limited to 1 to 2 hours a day and receive lucerne hay as supplementary feed. Cows producing less than 2 gallons of milk per day as well as cows in an advanced stage of pregnancy may be run on oats or wheat pasturage which has been grazed lightly by high producing animals, provided that one particular area is not grazed continuously for more than 7 days. It would be advisable in all cases to give high producing cows preference on grazing even where sufficient grazing is available. In cases where quantities of oats or wheat are limited, it goes without saying that the duration of the grazing period

Heartwater.

R. Alexander, W. O. Neitz and T. F. Adelaar, Division of
Veterinary Services, Onderstepoort.

HEARTWATER is a disease affecting cattle, sheep, goats and at least some antelopes. It is caused by a virus (*Rickettsia ruminantium*) which is transmitted by the bont tick (or tortoise-shell tick) *Amblyomma hebraeum*.* The disease is not contagious, that is, it is not transmitted from sick to healthy animals by contact. Experimentally it is transmissible by the subinoculation of infective blood or emulsified infected ticks under certain conditions. The virus is extremely sensitive and rarely survives for more than 24 hours outside the animal body or the tick.

Distribution.

Although all bont ticks are not necessarily infected with the virus, it may be accepted that, where this tick is found, heartwater is or may be prevalent. The tick is normally found in warmer and low-lying parts of the country, notably the whole of the Transvaal north of the Magaliesberg, the lowveld of the eastern Transvaal and thence in a broad band round the coastal area through Swaziland, Zululand, Natal and the Cape Province to a point beyond George. It is not found in the southern portion of South-West Africa, the Karoo, the Orange Free State, or the southern portion of the Transvaal. Normally it is not found in the highveld, but, if introduced during the spring or summer by the movement of stock, it may thrive and multiply to be the cause of heavy mortality before being killed off by the severe cold of the following winter.

The Tick.

The life cycle of the bont tick is similar to that of other species of three-host ticks, i.e., the larval, nymphal and adult stages each feed on different animals. Heartwater infection does not pass through the egg from the adult to the six-legged larvae of the next generation; thus all bont-tick larvae or seed ticks are free from infection. If either larvae or nymphae feed on an animal in which the virus is circulating in the blood, then the ensuing nymphae and adults respectively will be infective, and, on feeding subsequently upon a species of animal which is susceptible to the disease, no matter whether the individual is immune or not, the virus will be transmitted. If the animal is susceptible, it will develop symptoms of the disease after an incubation period of from 7 to 28 days, during which period it will show no deviation from normal health; if the animal is immune, then the virus will commence to circulate in the blood after the same period of incubation, but no symptoms of heartwater will develop. Should an infected tick feed upon an insusceptible species of animal, or on a susceptible or an immune animal, it does not lose its infection.

Animals Affected.

The disease is confined to cattle, sheep and goats, though recently it has been shown that certain antelopes, viz. springbuck and blesbuck, may contract heartwater and actually die. This observation

*A separate pamphlet on the life cycle of ticks and the diseases they transmit may be obtained, on application, from the Director of Veterinary Services, Onderstepoort, Pretoria.

is of importance in giving an explanation for the failure to eradicate infection on many farms. There appears to be no difference in the susceptibility of any breed of cattle or sheep, with the possible exception of Persians, though some breeds of cattle, and even some individuals within a breed, become more heavily infected with ticks than others—a phenomenon for which no satisfactory explanation has yet been given. Young animals up to the age of three weeks, irrespective of whether they are out of immune or fully susceptible dams, possess a high degree of resistance, which is quite distinct from, and must not be confused with, immunity. After the age of three weeks this resistance declines very rapidly and has completely disappeared by the age of two months. It is generally believed that the heaviest mortality from heartwater occurs in cattle at the age of about 12 months, and this is attributed to a resistance of calves while still suckling. This belief is, however, not supported by fact, since unweaned calves are fully susceptible.

Symptoms.

The symptoms vary greatly, and the disease is therefore not always recognized, or may be confused with other conditions, e.g. acute redwater, certain types of plant poisoning, arsenical or strychnine poisoning, and lamsiekte. In exceptional cases, particularly in sheep and goats, symptoms of the disease may develop as early as 7 days after the bite, even of a single infective tick, or alternately, their appearance may be delayed for as long as 28 days. This variation is due to differences in virulence of particular strains of the virus. Usually the first sign of infection is a sudden rise in temperature (cattle above 104° F., sheep above 105° F.), accompanied, in the case of milking animals, with a sharp decrease in milk flow. In the early stages this fever may be the only recognizable symptom, the animal appearing bright and continuing to feed. Death may occur suddenly at this stage, but usually the disease is more prolonged and has a course of from several days to more than a week. One of the most characteristic symptoms is the development of nervous disturbances, as shown by twitching of the ears, nodding of the head, quivering of the muscles, high stepping or staggering gait, walking in a circle, or extreme viciousness, all accompanied by a peculiar staring anxious expression of the eyes. In some cases the animals are constipated; in others diarrhoea may be profuse. The appetite is now lost, though large quantities of water may be drunk. Rapid emaciation sets in and the animal may stand in a semicomatose attitude, pushing its head against a wall, making chewing movements with the jaws and frothing at the mouth and nostrils. Later it may go down, lie stretched out on its side with the head pulled back, and make galloping movements with the legs. At this stage the temperature may be normal or even subnormal. Death is now the usual sequel, but it may be delayed for several days. In animals which recover, the symptoms described gradually subside and the temperature slowly returns to normal, but convalescence is usually prolonged.

Even in untreated animals the mortality may vary from as low as 10 per cent. to practically 100 per cent. This variation in the severity of the disease produced by different strains of virus in different localities, or even within the same locality, is a striking feature, and, accompanied by the great differences in the symptoms shown, may account for the frequent failures to recognize the condition.

Post Mortem Appearance.

Evidence of galloping movements of the feet, as shown by clearing of the bedding or grass in a semi-circle round the body, should be noted. When the chest is opened, the cavity frequently is seen to contain a large quantity of clear, straw-coloured fluid, which may or may not be coagulated. The lungs are usually dark in colour and, on being cut, quantities of clear or blood-stained froth exudes from the cut surface. As the common name of the disease implies, the heart-sac may contain large quantities of clear, straw-coloured fluid; this is frequently found in sheep and goats, but is the exception rather than the rule in cattle. The spleen is somewhat enlarged, though not to the same extent as in redwater, and the consistence remains fairly firm. The liver and kidneys are usually only slightly affected, but the stomach and small intestines may show signs of acute inflammation.

Diagnosis.

Examine the animal for the presence of bont ticks, though it will be appreciated that the infected ticks which could have set up the infection, may probably have engorged themselves and dropped off many days before. Frequently it is possible to make a diagnosis from the symptoms, particularly in the later stages of the disease, together with the findings on post-mortem examination, but just as frequently even the most experienced have difficulty. A diagnosis cannot be made from a blood smear, and it is only very rarely that a spleen smear has any value. The only specimens of any value are a portion of the brain, which should be placed in 10 per cent. formalin as a preservative, or smears made from scrapings of the inner surface of the jugular veins. When such smears or specimens are submitted to Onderstepoort, they should be distinctively labelled, as they require special examination.

Treatment.

Uleron and sulphapyridine (M & B 693, or Dagenan) have been found to be of real value in the specific treatment of the disease. For success, it is essential that treatment should be started early in the course of the disease. Unfortunately, by the time a definite diagnosis can be made, usually after the appearance of the well-defined nervous symptoms, the condition is too far advanced to respond to any treatment. Consequently, in the heartwater-infested areas, particularly of the northern Transvaal, a routine practice has been developed which is giving excellent results. Any animal which is noticed to be "off colour" is examined, and if the temperature is above normal (103° F. in the morning, or 104° F. in the afternoon—both after a period of rest out of the sun), the case is regarded as one of either redwater or heartwater in the very early stage. A blood smear is taken from the ear, and possible redwater is controlled by the injection of Pirevan, Acaprin or Gonacrin, while possible heartwater is controlled by the use of either of the sulphonamides: Uleron, or sulphapyridine. Subsequent treatment depends upon the response.

In the case of redwater, the temperature should be down to normal within 24 hours, and the animal showing marked improvement; no further treatment is then necessary. If the temperature remains high or continues to rise, the infection is probably heartwater, and the sulphonamide injection should be repeated every 12 to 24 hours until improvement sets in. It is seldom necessary to repeat the injection more than three times. It is admitted that this

system has many defects, but in conjunction with systematic immunization against gallsickness, and in the absence of veterinary assistance, it provides the farmer with a practical method of procedure of great value.

The sulphonamides mentioned are available in several forms, namely:—

(1) *Uleron* which is insoluble in water, but soluble in 1·3 per cent. sodium hydroxide (caustic soda) in which it should be made up as a 10 per cent. solution.

(2) *Uleron sodium* which is soluble in distilled water. The dose of both the above is 10 c.c. of the 10 per cent. solution (= 1 gramme of the powder) per 100 lb. body weight. Thus a tollie weighing 500 lb. would be given 50 c.c.

(3) *Sulphapyridine* which is insoluble in water and should be made up as a 33·3 per cent. solution in 10 per cent. caustic soda (preferably by a chemist). At this concentration the solution is saturated, and, if some of the powder should be precipitated, it may be brought back into solution by the addition of a few c.c. of water. The dose of this sulphapyridine solution is again 10 c.c. per 100 lb. body weight.

(4) *Dagenan* which is a fluid; the dose is the same.

Whichever drug is used, the injection must be given intravenously and very slowly; if even a small amount gets under the skin, it will produce a large painful swelling and often an abscess. The solutions keep well if stored in a tightly stoppered bottle, but it is preferable to use freshly made up solutions. The doses indicated are the smallest which have been given satisfactory results; they may be doubled with complete safety. Repeat half the first dose every 12 hours up to a maximum of 6 injections, depending upon the response to treatment. Additional treatment consists of good nursing and feeding, and the treatment of such additional symptoms as arise (e.g. constipation) by the judicious use of raw linseed oil or Epsom salts as a purgative. Diarrhoea usually clears up together with the general response to specific treatment.

Immunity.

An animal which recovers from an attack of the disease, either with or without treatment, is immune, and that immunity persists for many years, if not for life, and, in any case will be reinforced by recurrent infection on an infected farm. Although different strains of virus vary widely as regards virulence and response to specific sulphonamide treatment, even the mildest strain produces a solid immunity to the most virulent. Therefore, an animal which is immune to heartwater in one area, is immune to heartwater in another.

*

Prevention and Control.

Dipping.—As heartwater is a tick-born disease, every effort should be made to reduce the tick population by regular 7-day dipping in a dip of proper strength, in conjunction with hand-dressing. On many farms the disease has been completely eradicated in this way, but it cannot be too strongly emphasized that dipping of all stock must be regular, conscientious, and persistent if good results are to be obtained, because experience has shown that the bont tick is one of the most difficult to eliminate.

Trekking.—An outbreak of heartwater may be controlled, particularly on large farms, by trekking from one part of the farm to another, in conjunction with regular dipping. The general idea

is to move from one camp or farm to another at intervals of three weeks, during which time infected animals will have developed symptoms and may be isolated, while infected ticks will either have been destroyed or have dropped to the ground and will not have had time to moult to the next stage.

Attention must be directed to the extreme danger of trekking with animals in search of grazing to and from the highveld and the heartwater-infected lowveld. It must be appreciated that the immune animal may act as a reservoir for the infection of clean bont ticks without showing any symptoms of the disease at all. If infected ticks are carried to the highveld, say at the beginning of summer, they may be the cause of heavy mortality amongst the fully susceptible cattle or sheep. Trekking and the promiscuous movement of stock from one area to another cannot be too highly condemned. as owners through whose farms the trek roads pass, know to their cost.

Immunization.

During recent years farmers have developed the practice of allowing calves to become heavily tick-infected by not dipping them until they are weaned, in the hope that they will pick up infection and recover before they become fully susceptible. As has been stated, the resistance of the new-born persists for only about the first three weeks of life, and any success which appears to have attended this method is probably due to failure to attribute heavy calfhood mortality to heartwater.

A practical method of immunization which could be applied by farmers themselves, has not been developed, chiefly because it has not been possible to cultivate the virus artificially and because the virus dies out, usually within 24 hours, outside the animal body. Immunization is possible by using a selected strain of virus, propagated in susceptible sheep, to infect calves before they reach the age of three weeks; these calves usually shows no reaction and develop a strong immunity. In the case of older animals the reaction produced by the virulent sheep blood may be controlled by suitable treatment with sulphonamides. There are, however, so many practical difficulties attached to this rather crude method of immunization, that it is reasonably safe only in skilled veterinary hands.

Oats and Wheat as Grazing for High-Producing Cows :—

[Continued from page 547.]

per day will have to be limited and supplementary feed provided according to the production level.

Good hay of other legumes will yield the same results as lucerne hay when used as supplementary feed. In the case of cows yielding up to 4 gallons of milk and grazing on oats or wheat for four hours or longer per day, other good quality hay such as sudan grass or babala will yield as good results as lucerne hay. Cows producing more than 4 gallons of milk per day, however, will need extra feed if non-legume hay is used to supplement grazing.

Hormone Sprays and the Control of Pre-Harvest Drop of Apples.

Dr. H. L. Pearse, Western Province Fruit Research Station,
Stellenbosch.

ONE of the difficulties with which the apple farmer is faced at harvest time, is the dropping of fruit from the tree before it can be picked. This drop is especially severe in certain varieties, and it can occur before the fruit has reached its best picking stage of maturity for marketing and for storage purposes. It is undoubtedly one of the main factors responsible for the tendency on the part of many farmers to pick the fruit too green. When large numbers of of a single variety are grown, bad weather or labour shortages may so delay harvesting that considerable losses of fruit by dropping inevitably occur, unless the fruit from some of the trees is picked at a very early stage.

In a previous article* the author described the mechanism of fruit drop and discussed some of the factors responsible for variations in the severity of the drop and in the measure of control of drop obtainable by the use of hormone sprays. The use of such sprays in controlling pre-harvest drop in apples has been a general orchard practice in the United States of America and other fruit-growing countries for several years now, and in many instances has enabled the farmer to pick his fruit at the best stage of maturity without incurring undue losses as a result of pre-harvest drop.

The present report contains an account of experiments carried out at Elgin, Western Province, during the 1945-46 fruit season on trees of two of the apple varieties which give considerable trouble in this area on account of pre-harvest drop. These experiments were carried out with the object of—

(1) assessing the effectiveness of hormone sprays in controlling pre-harvest drop of apples at Elgin; and

(2) evaluating the difference, if any, in the effectiveness of some of the commercial pre-harvest drop sprays now coming on the market in South Africa.

Method.

All dropped apples were cleared from under the trees at the beginning of the experiment. Separate rows of trees were then sprayed with each of the various hormone sprays, a good drenching spray being applied at a pressure of about 350 lb. per sq. in. and at the rate of from 3 to 5 gallons per tree. Care was taken to cover the fruit well with the spray. As far as possible spraying was carried out during warm still weather, and during the warm part of the day, operations usually commencing about 10 a.m. Under such conditions the hormone is likely to be more quickly effective. Ten trees in each treatment were selected for recording subsequent dropping of fruit, all abnormal trees bearing very light crops being rejected, and ten unsprayed trees were used for comparative records. From the time of spraying all dropped fruit was counted every three or four days, and sorted into two classes, namely, good clean fruit, and culls which consisted mainly of fruit attacked by the codling maggot. At harvest time the total number of fruit remaining on the trees was determined, and dropping was

* Pearse, H. L.—Hormone Sprays and the Pre-harvest Drop of Fruit.
F. in S.A., December, 1945.

calculated as a percentage of the total fruit present on the trees at the beginning of the experiment. In the experiment with Ohenimuri the number of fruit attacked by the codling moth was also determined in the harvested fruit. Four experiments were carried out, two with the variety Ohenimuri and two with the variety Rokewood.

The Various Sprays Used.

(1) Pure alpha naphthalene acetic acid at a concentration of 0.001 per cent. This was prepared by dissolving the requisite amount

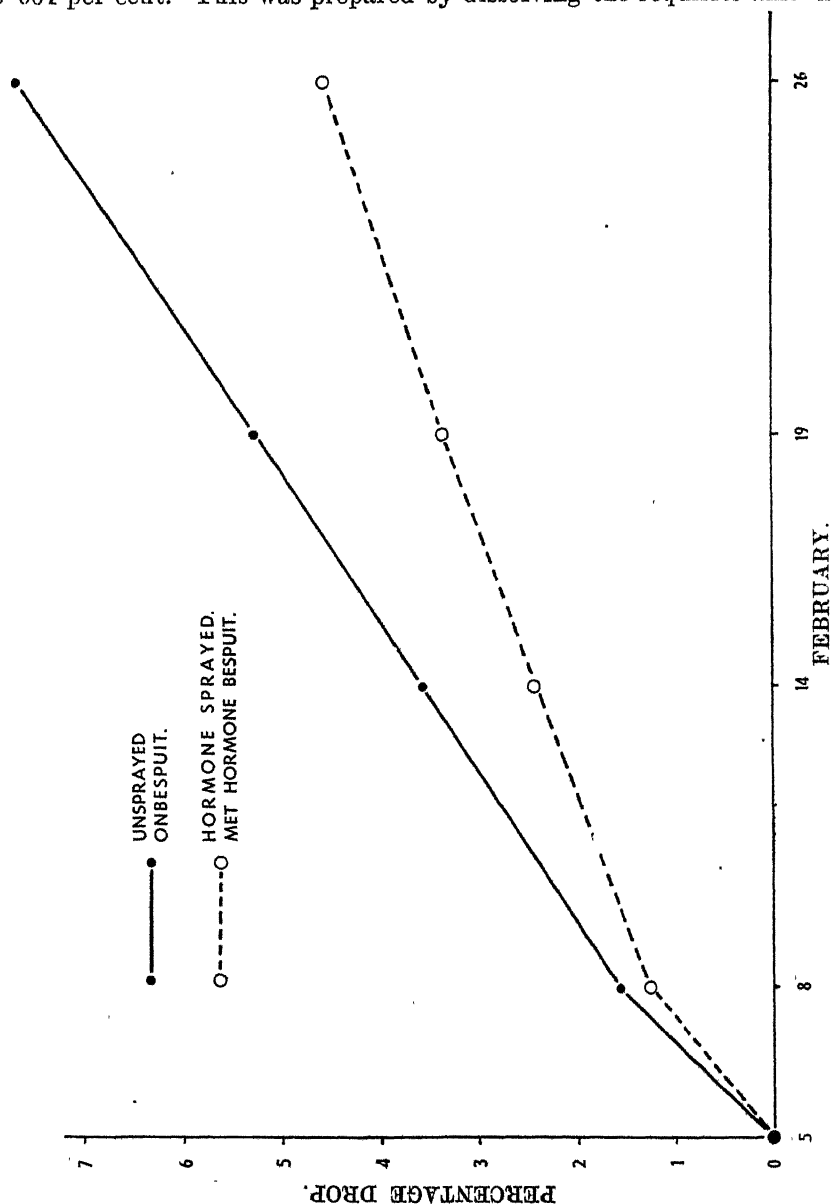


FIG. 1.—Ohenimuri. 1st Experiment. Percentage drop from spraying to harvesting. For the sprayed trees the mean of all treatments is shown.

HORMONE SPRAYS FOR APPLES.

of the acid in a small quantity of 95 per cent. alcohol and adding this solution directly to the water in the spray tank.

(2) A commercial preparation containing as the active ingredient the sodium salt of alpha naphthalene acetic acid. This was in powder form and could be added directly to the spray water.

(3) A commercial spray sold in tablet form. The tablets are first dissolved in a little warm water and the resulting solution mixed with the requisite amount of water.

(4) A commercial spray sold in liquid form and containing in addition to the hormone a very efficient spreading agent. This is ready for direct use as a spray on dilution to the right concentration with water.

Results.

Ohenimuri.

This variety was selected for experimental purposes as it is widely grown, and gives considerable trouble on account of fruit drop. The fruit is borne in close clusters, and the individual fruits have very short stalks so that it is almost impossible to ensure wetting of the stalks of the fruit when spraying.

1st Experiment. The trees were sprayed on the 5th February and harvested on the 26th February. Drops were counted every few days from the time of spraying, and the progressive percentage drop is shown in Fig. 1.

Table I shows the total percentage drop over the whole period, and the percentage drop of sound fruit.

TABLE I.—*Ohenimuri, 1st experiment. Percentage drop. 10 trees in each treatment.*

Treatment.	No. of fruit per tree.	Sound fruit per tree.	Percentage Drop.	
			All fruit.	Sound fruit.
Unsprayed.....	880	701	10.93±0.84	7.58±0.64
Alpha naphthalene acetic acid..	856	738	6.58±0.38	4.88±0.43
Spray No. 2.....	485	459	6.00±0.71	3.88±0.48
Spray No. 3.....	646	545	6.73±0.71	5.12±0.66

2nd Experiment. The trees were sprayed on the 7th March and the fruit was harvested on the 20th March. The progressive percentage drop is shown in Fig. 2, and the percentage drop over the whole period in Table II.

TABLE II.—*Ohenimuri, 2nd experiment. Percentage drop. 10 trees in each treatment.*

Treatment.	No. of fruit per tree.	Sound fruit per tree.	Percentage drop.	
			All fruit.	Sound fruit.
Unsprayed.....	1,400	1,020	25.78±1.31	28.00±1.83
Alpha naphthalene acetic acid..	1,334	911	8.72±1.32	9.37±1.73
Spray No. 4.....	1,143	783	8.35±1.19	7.50±0.87

In the first experiment (Table I and Fig. 1) dropping was comparatively light and the trees were harvested at an early stage, probably considerably before the best picking stage of maturity had been reached. It is, however, clear from the results that the sprays had a considerable effect in reducing drop, resulting in an average saving of approximately 24 clean fruit per tree, or 3 per cent. of the total crop of clean fruit.

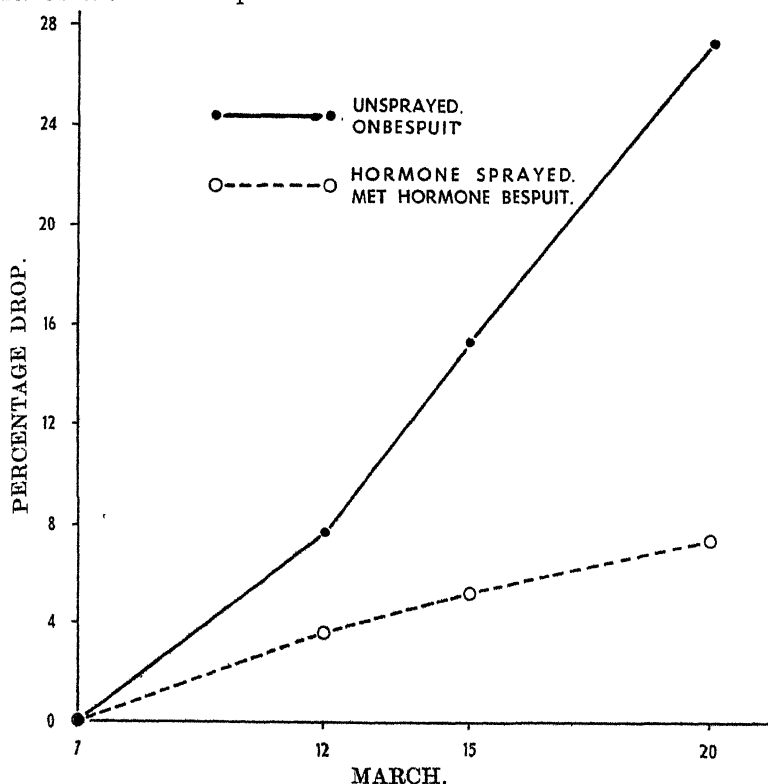


FIG. 2.—Ohenimuri. 2nd Experiment. Percentage drop from spraying to harvesting. For the sprayed trees the mean of the two hormone treatments is shown.

The second experiment (Table II and Fig. 2) was carried out over a month later than the first, and dropping was well under way when the trees were sprayed. These trees were probably harvested at about the best picking time for marketing and storage purposes. The hormone sprays exerted a very satisfactory measure of control of dropping and resulted in an average saving of approximately 178 clean fruit per tree, or about 20 per cent. of the sound fruit present on the tree at the time of spraying.

In both experiments it is clear from Figs. 1 and 2 that the hormones require about 3 days from the time of spraying before they became effective. In both experiments the differences between the effectiveness of the various hormone sprays used were within the limits of experimental error, and were not significant. The satisfactory results obtained with this short-stalked and close-clustered variety would seem to indicate that the applied hormone is able to exert its effect even if the stalk of the fruit is not wetted by the spray.

HORMONE SPRAYS FOR APPLES.

Rokewood.

Considerable losses by dropping occur with this late variety, especially if the north-westerly winds, which are common at the time of the year when this variety is harvested, prevail. The fruit is borne on fairly long stalks which therefore become well wetted when the sprays are applied.

1st *Experiment*. The trees were sprayed twice, the first spray being applied on the 2nd April and the second on the 16th April.

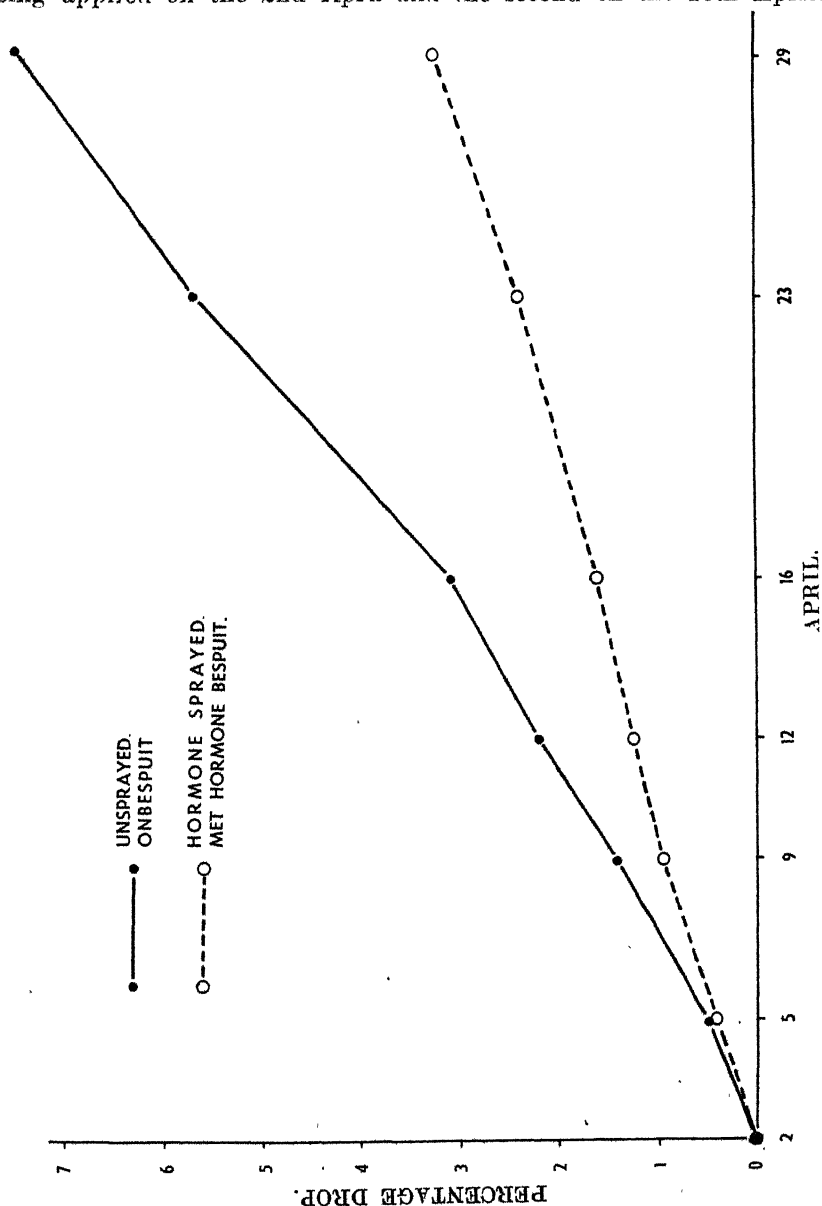


FIG. 3.—Rokewood. 1st Experiment. Percentage drop from the time of first spraying to harvesting. For the sprayed trees the mean of all treatments is shown.

The fruit was harvested on the 29th April. The progressive percentage drop is shown in Figure 3, and the total percentage drop over the whole period in Table III.

TABLE III.—*Rokewood. 1st experiment. Percentage drop. 10 trees in each treatment.*

Treatment.	No. of fruit per tree.	Percentage drop.	
		All fruit.	Sound fruit.
Unsprayed.....	1,067	9.56±0.70	7.80±0.57
Alpha naphthalene acetic acid.....	887	3.84±0.24	3.32±0.23
Spray No. 2.....	1,065	5.19±0.72	3.96±0.56
Spray No. 3.....	899	3.25±0.42	2.53±0.39
Spray No. 4.....	985	4.63±0.48	3.82±0.33

2nd Experiment. The trees used in the second Rokewood experiment were rather larger, and bore a heavier crop, than those used in the first experiment. The trees were sprayed on the 9th April and again on the 23rd April, and the fruit remaining of the trees was harvested on the 29th April. The progressive percentage drop is shown in Figure 4, and the total percentage drop of all fruit and of sound fruit only is shown in Table IV.

TABLE IV.—*Rokewood. 2nd experiment. Percentage drop. 10 trees in each treatment.*

Treatment.	No. of fruit per tree.	Percentage drop.	
		All fruit.	Sound fruit.
Unsprayed.....	1,455	7.91±0.32	7.15±0.36
Alpha naphthalene acetic acid.....	1,390	3.79±0.30	3.08±0.26
Spray No. 2.....	1,425	3.98±0.45	3.34±0.36
Spray No. 3.....	1,791	3.28±0.24	2.60±0.18
Spray No. 4.....	2,047	3.32±0.31	2.75±0.29

In the experiments with Rokewood trees, although dropping of fruit was not very heavy, the hormone spray treatments gave a considerable measure of control of the dropping that did occur. Differences between the percentage drop for the various spray treatments were again not significant. In the first experiment (taking the average percentage drop for all treatments), the saving amounted to approximately 43 clean fruit per tree, or 4.4 per cent. of the crop; and in the second experiment, 68 clean fruit per tree, or 4.2 per cent. of the crop. The percentage drop figures were very similar in these two experiments, and the higher figure for clean fruit saved per tree in the second experiment was almost entirely due to the fact that the trees were bearing a considerably larger number of fruit.

From Figs. 3 and 4 it is clear that there is little difference in the dropping of fruit from sprayed and unsprayed trees until about three days from the time of spraying have elapsed, and this is evidently the time required for the hormone to become effective. In this respect therefore trees of the Rokewood variety behaved similarly to those of the Ohenimuri variety.

Effect of Hormone Sprays on Fruit Attacked by Codling Moth.

In Table V the percentage of the total drop representing fruit damaged by the codling maggot is given for the four experiments. The figures for the sprayed trees represent the mean of all treatments.

HORMONE SPRAYS FOR APPLES.

TABLE V.—*Percentage of total drop representing fruit attacked by the codling maggot.*

Series.	Unsprayed.	All Hormone Treatment.
Ohenimuri No. 1.....	43·74±2·47	38·97±2·99
Ohenimuri No. 2.....	21·06±1·18	33·48±1·81
Rokewood No. 1.....	19·64±1·96	21·59±3·01
Rokewood No. 2.....	11·69±1·24	18·35±1·46

From Table V it is clear that the only experiment in which the percentage of the total fruit drop due to codling-maggot damage was very different in the sprayed and the unsprayed series, was the second Ohenimuri experiment where the trees were sprayed comparatively late. The difference obtained in the second Rokewood experiment was small, but was, however, just significant.

The explanation of these results probably lies in the fact that fruits damaged by codling maggot are physiologically always more advanced in maturity than sound fruit. The puncturing of the skin presumably facilitates gaseous exchange between the fruit and the external atmosphere, because tests carried out by the author have shown that such damage causes a rise in the respiration rate of the fruit. It is therefore likely that natural hormone production ceases earlier in these more advanced fruit, and consequently results in earlier formation of the abscission layer in the stalk of the fruit. The fact that no difference was obtained between the percentage of the total drop due to damaged fruit in sprayed and unsprayed trees in some experiments, shows that the applied hormone is capable of acting similarly on damaged and undamaged fruit, provided the spray is applied early enough. It is clear, therefore, that in the experiment where a distinct difference was obtained, the spray was applied when the majority of the damaged fruits were past the stage of maturity at which they could react to the spray, whereas the majority of the sound fruits, being less advanced, were still reactive.

Discussion.

It is clear from the results obtained in the experiments described in this report that hormone sprays exert a considerable measure of control on the pre-harvest drop of Ohenimuri and Rokewood apples growing at Elgin, Cape Province, and that any well known brand of hormone spray can be used with confidence by the grower. There was no significant difference between the effects of any of the various sprays used in these experiments. This is perhaps not surprising if we remember that the active concentration of the hormone is extremely small, and that the amount of hormone reaching the seat of the abscission layer in the stalk of the fruit is therefore not usually likely to be a limiting factor in determining the success of the spray applications. In the case of varieties used in these tests it seems quite safe to delay spraying until dropping of the fruit has begun.

The cost of the spray solutions at present appears to be in the neighbourhood of five shillings per 100 gallons, that is, about three pence per tree, allowing an average of 5 gallons per tree for efficient coverage, and excluding labour costs. In order to derive the maximum benefit and saving from the use of these sprays, the farmer must use his own discretion in deciding which trees it will pay him to spray, bearing in mind that some varieties drop their fruit much more readily than others and that the heavier the crop the greater is

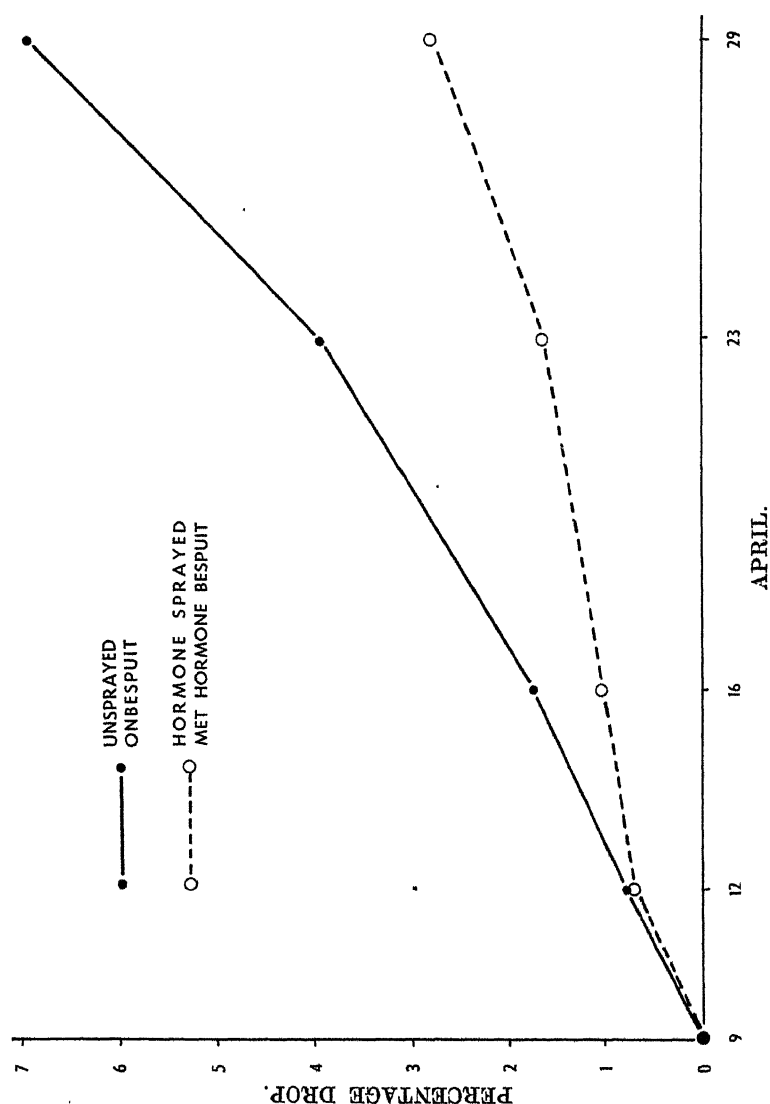


FIG. 4.—Rokewood. 2nd Experiment. Percentage drop from the time of first spraying to harvesting. For the sprayed trees the mean of all treatments is shown.

the saving of fruit likely to be, the cost of application remaining approximately the same.

The period of effectiveness of a single spray application has not yet been determined exactly, and is likely to vary slightly from season to season and from area to area; but the average period for these tests appears to be in the neighbourhood of fourteen days from the time of spraying, and of this period the first three days are required for the hormone to diffuse into the tissues and to become fully effective.

Dropping of fruit is undoubtedly one of the chief factors tending to make the farmer pick his fruit in an immature state, so that the wider use of hormone sprays in South Africa should do much to remedy this trouble.

The Farm Home.

(A section devoted mainly to the interests of Farm Women.)

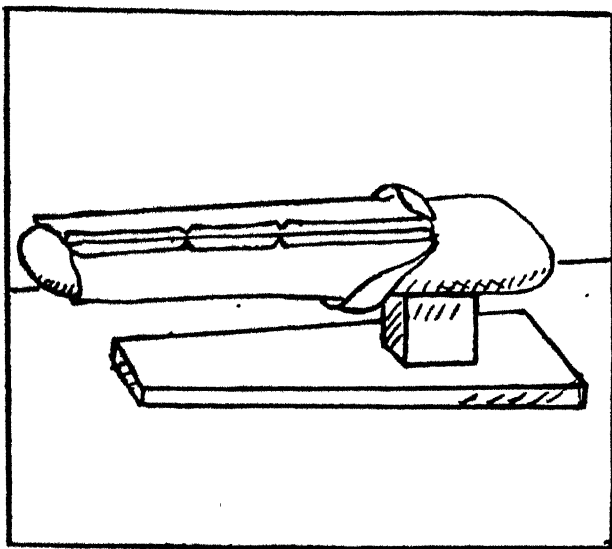
Ironing.

Miss Kotie Richter, Home Economics Officer, College of Agriculture, Glen.

IRONING is the process of smoothing out material by means of pressure, moisture and heat.

Even before the flat-iron (or sad-iron) was invented, material or garments were smoothed by spreading them out flat under a mat. Since the introduction of the first iron, however primitive, ironing has been a bugbear, and it will probably always be that.

Every housewife provides some place for ironing in her home, but only too often the darkest corner is chosen for this purpose. What, however, can be regarded as a convenient place for ironing? Let us enumerate the prerequisites.



Apparatus.

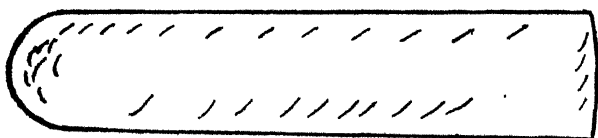
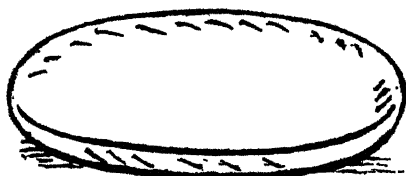
The Ironing Table.—It should be sturdy and have a smooth surface without joins. Every housewife should see that it is of a convenient height, since ironing on tables which are too high or too low can be very tiring. Do not forget to spread a soft rug in front of the table for standing on and be sure that there is sufficient light on the table.

The Ironing Blanket, Sheet and Pressing Cloth.

An ironing blanket should be thick and smooth. An old blanket would be suitable if folded over twice. Sew up the sides to keep it in position.

The sheet should be smooth and seamless. It should be large enough to cover the blanket and should be washed regularly.

Pressing cloths are essential, especially for the ironing of clothing. For heavy fabrics and men's clothes it is advisable to place a piece of the same material, serge or flannel under the damp pressing cloth. This will help to raise the nap and so prevent the article from becoming shiny. Therefore always save a piece of the material of a woollen article for this purpose.



A piece of an old sheet or pillow-slip will come in very handy when a pressing cloth is required.

An *ironing board* and a *sleeve board* are very useful, especially for the ironing of frocks. These can very easily be made at home. The former consists of a long, narrow board, tapering at one end so that the article can be slipped over it. The sleeve board is of a similar shape, only very much narrower to fit a sleeve.

The ironing board and the sleeve board naturally have their own blanket and sheet which are easy to remove or put on. It is also a good practice to make a loose cover for them to protect the ironing sheets when the boards are stored.

Ironing pads.—A few stuffed pads, one round and the other oblong, are necessary for pressing darts, shoulder-seams and seams in sleeves.

The round one can be made from 2 circles of material, stitched together. Stuff it in such a way that the bottom is flat and the top rounded. Do not use wadding because it is inclined to become lumpy. Kapok, scraps of material or wool should be used for the stuffing. The oblong pad should be about 2 in. in diameter and 12 in. to 14 in. long. It is ideal for pressing seams and sleeves and other parts of garments which are shaped and thus difficult to press on a flat surface. The stuffing in this pad should be firm and well rounded.

We now, come to the ironing process. Different methods are employed for different garments.

The Ironing Process.

Towels and similar articles.—These articles need very little ironing. Shake them out well while still damp to obtain a good soft texture and iron the edges only with a moderately warm iron when they are dry.

Underclothing.—Here it is especially important to distinguish between cotton, silk and rayon. There are two kinds of rayon. Like cotton, one type can be ironed with a fairly hot iron, but acetate rayon melts under a hot iron and is consequently easily damaged. Knitted underwear falls in this class and should be ironed with a cool iron when dry. If shaken out well a couple of times, while drying, it needs very little ironing. Elastic should not be ironed at all, since it perishes very easily under heat and consequently becomes stretched and useless.

Cotton is damped slightly and folded neatly, and left for at least an hour before ironing, to ensure even dampening of the material.

Linen and cotton are ironed when still damp. Use a hot iron and first iron the hems on the wrong side, and then the whole article on the right side.

Always iron along the thread of the material and iron all seams and hems till thoroughly dry. Do not fold and press articles because deep folds in the same place eventually wear out the material along the folds. Fold articles lightly after ironing, or wind around a roller used specially for this purpose.

Embroidered linen or cotton should be ironed on a soft surface on the wrong side first and then on the right side. If ironed in this manner, the embroidery will have the desired embossed appearance. Iron until quite dry.

Rayon.—Smooth material, like the various types of rayon, is always ironed with a moderate iron while the material is still damp. Here, too, you must not forget to follow the thread of the material. Use a cool iron for acetate rayon.

Woollen material is always smoothed out by means of steam and pressure. Woollen articles washed or newly made are treated in the same way in regard to pressing. First place a dry cloth on the article and then a damp one over that. Press with a hot iron. The steam which penetrates to the article dampens it and it is smoothed out by means of the pressure. Do not press too heavily since this leaves marks and also causes the fabric to become shiny.

Velvet is ironed in the same way as woollen materials, but in this case no pressure is applied. Cover the flat surface of a hot iron with a wet cloth and, as soon as the steam appears, hold the wrong side of the velvet against it. The steam penetrates the material and brings up the nap on the right side again. Only small sections can be done at a time. Velvet can also be steamed over boiling water.

Stiff collars.—Of all the washable articles in the home, men's stiff collars require most attention. After thoroughly washing and drying the collar, rub by hand to separate the different layers of fabric. Soak the collar thoroughly in the following starch solution:—Mix 1 tablespoon of starch with 1 cup of cold water. Dissolve 1 teaspoon of borax in a little boiling water. Allow the solution to cool and add it to the starch mixture. Finally, add 3 to 4 drops of turpentine. Allow the starch to soak thoroughly into the layers. Roll the collar up in a clean cloth and leave for half-an-hour.

Then wipe the collar with a piece of muslin to remove excess starch. Pull it into shape and place it on the table, right side up, with the buttonholes towards the ironer. Using a fairly hot iron, run the iron over it lightly once on the wrong side. Continue ironing

on the right and wrong sides till the collar is stiff and dry. It should not be too hard, however, but slightly pliable.

Iron the cuffs in the same way. Four things are necessary for glossing a collar, viz. moisture, a high temperature, a hard surface and heavy pressure. Place a glossing board under a sheet, rub the collar with a damp cloth first and then with a dry one. Using a very hot iron, press the edges till they are glossy with the broad surface of the iron partly on the board and partly on the collar. Then gloss the collar. Press hard with the broad surface of the iron when ironing forward and draw the iron back lightly on its tip. The strokes of the iron on the fabric should overlap.

To shape a simple upright collar, curve it with a cool iron. Place the collar on the table and press the iron on it with the right hand so that the collar can be curved over the iron.

All collars and cuffs should be aired thoroughly, otherwise they will become limp.

Other starched articles.—Collars are, however, not the only articles in the home which require starching. A very weak starch solution is used for overalls, pinafores and tablecloths. The solution is so weak that it cannot really stiffen the material, but merely helps to retain the shape of the garment and thus treated, the garment does not soil readily.

A boiled starch is used for this purpose. Mix $1\frac{1}{2}$ tablespoons of starch with a little cold water to a paste. Add $\frac{1}{2}$ teaspoon of borax and $\frac{1}{2}$ teaspoon of candlewax. Then add 4 cups of boiling water to the mixture and boil slowly until the mixture becomes transparent. The starch is then ready. Strain the mixture through a cloth and soak the articles in the hot solution. A little blue can be added to the starch for white fabrics.

Iron the starched articles, first on the wrong side till they are thoroughly dry and then on the right side just to give them a sheen.

Lace and knitted fabrics.—These materials need very little ironing. It is always practical to trace the size of the article on paper before it is washed and then to shape the article accordingly, while it is drying. Shaking lightly in the process of drying, always helps to ensure a loose and fluffy texture.

Lace or crochet-work can be pinned into shape with steel pins and then ironed lightly on the wrong side on a very thick ironing blanket.

Knitted articles should be ironed very lightly on the wrong side with a moderately warm iron. The pressure of a damp towel on a knitted article is sufficient to flatten it out. Heavy pressing on knitting is most undesirable.

Correct methods of washing and ironing will lengthen the life of an article considerably. Careless ironing results in a complete loss of shape. This is especially true of starched articles, for these can be most unattractive when stretched out of shape. Deep folds are very bad too for they weaken the fibres. When articles have been ironed, they should be folded neatly and just pressed down lightly with a moderately warm iron.

Crops and Markets

A Statistical and Economic Review of
South African Agriculture

by

The Division of Economics and Markets

Volume 26

AUGUST 1946

No. 288

CONTENTS

	PAGE
Price Review for June 1946*	565
Index of Prices of Agricultural and Animal Products	566
Prices of Dairy Products	566
Control Measures for the Marketing of Groundnuts	567
Agricultural Conditions in the Union during June 1946	567
Producers' Prices of Baconers.	567
Crop Estimates. Drybeans and Groundnuts 1946	568
Estimate of Expected Kaffircorn and Potato Crops—1945/46	
Season	568
Prices of Fertilizers	569
Index and Price Tables	570

Price Review for June 1946.*

Apples.—On the whole, apple consignments decreased during the month. Although the Johannesburg market was well supplied with apples, the prices of the following varieties increased in comparison with those of the previous month:—Ohenimuri apples from 19s. 8d. per bushel box to 22s. 8d. per bushel box; White Winter Pearmain from 20s. 3d. to 23s. 2d.; and Wemmershoek from 21s. 3d. to 22s. 6d. The prices of apples on the Cape Town market decreased somewhat.

Citrus.—The supplies of naartjies, oranges and lemons increased considerably towards the end of the month and sold well.

Tropical Fruit.—Papaws, grenadellas, avocados and quavas were well represented on the Johannesburg and Port Elizabeth markets, while smaller consignments reached the other markets. On the East London market papaws were extremely scarce and dear.

Vegetables.—Good supplies of vegetables reached the markets. The main varieties offered were cabbages, cauliflowers, pumpkins, carrots and green beans. Only small quantities of beetroot, spinach and marrows appeared on the markets. The prices of vegetables were generally lower than those of the previous month.

Tomatoes.—The markets were well supplied with tomatoes, but some consignments were green and prices decreased, e.g. on the Johannesburg market from 2s. 11d. per tray in May to 2s. per tray in June, on the Cape Town market from 3s. 8d. to 2s. 10d. and on the Durban market from 2s. 3d. to 1s. 5d.

Potatoes.—Large consignments of highveld potatoes reached the Johannesburg market, but the quality was poor. On the East

* All prices mentioned are averages.

London market potatoes were scarce, and maximum prices were obtained. The supplies on the other markets were fair.

Sweet Potatoes and Onions.—The supplies of sweet potatoes were reasonable and prices remained firm. The onion consignments decreased and prices increased. On the Johannesburg market Cape onions increased from 13s. 9d. per bag in May to 15s. 5d. in June; on the Cape Town market from 11s. 9d. to 12s. 2d.; and on the Pretoria market from 13s. 9d. to 17s. 1d.

Poultry and Poultry Products.—Poultry deliveries were insufficient, and sales were very stable. Eggs were well represented, and prices decreased. On the Cape Town market especially, prices decreased from 28s. 6d. per 100 in May to 26s. 9d. per 100 in June.

Fodder.—The Johannesburg market was well supplied with teff and sweet grass. Lucerne, oats and other varieties were scarce.

Index of Prices of Agricultural and Animal Products.

As reflected in the table published elsewhere in this issue, the following important price changes occurred during June 1946:—

(a) *Summer cereals* decreased from 250 to 247 as a result of a slight drop in the price of kaffircorn.

(b) *Hay* increased from 170 to 178.

(c) *Dairy products* increased from 186 to 218 as a result of the winter premiums on butterfat, cheesemilk and factory milk.

(d) *Poultry and poultry products* decreased from 332 to 295.

The general index indicates a slight decrease, viz from 184 to 183 in June.

Prices of Dairy Products.

Butterfat.—During June 1946 a winter premium of 4d. per lb. butterfat was paid to producers, which was increased to 6d. per lb. as from 1 July 1946. The basic prices on which this premium is paid, is fixed at 2s. 1d., 1s. 11d. and 1s. 9d. per lb. for 1st, 2nd and 3rd grade butterfat, respectively.

Cheesemilk.—During June 1946 a winter premium of 2d. per gallon cheesemilk (or 5½d. per lb. butterfat contained therein) was paid to producers, which was increased to 2½d. per gallon (or 6½d. per lb. butterfat) as from 1 July 1946. The basic price in the case of cheesemilk is 10½d. per gallon (or 2s. 4½d. per lb. butterfat).

Condensing Milk.—The price received by producers for condensing milk was increased from 11½d. per gallon (or 2s. 7½d. per lb. butterfat) to 13½d. per gallon (or 3s. 2½d. per lb. butterfat) as from 1 June 1946, and to 14½d. per gallon (or 3s. 3½d. per lb. butterfat) as from 1 July 1946.

Control Measures for the Marketing of Groundnuts.

The world shortage of vegetable fats and oils, particularly in Europe, has minimized the Union's chances of importing all its requirements of groundnuts. Normally the bulk of the Union's consumption is imported. The cancellation of the trade agreement with the Union by India has also made the position worse.

Consequently, the Director of Foodstuffs has considered it necessary to seize all available supplies within the Union. No producer, co-operative society or company may, therefore, sell groundnuts to any person other than to Director of Foodstuffs. The price at which the groundnuts will be bought, will not exceed the maximum price fixed by the Price Controller, which is at present 35s. per 100 lb. unshelled, if at least 60 per cent. of the kernels are sound, and 55s. per 100 lb. for shelled groundnuts which do not contain more than 2 per cent. foreign matter. For undergrade groundnuts, shelled or unshelled, the price will be determined between buyer and seller. (For particulars see *Gazette Extraordinary* of 5th June 1946).

The 1945-46 groundnut crop is estimated at 240,000 bags of 100 lb. unshelled.

Agricultural Conditions in the Union during June 1946.

Rainfall.—Scattered showers occurred in the western and south-western Cape Province and Transkei, while the rest of the Union was still drought-stricken.

The condition of the animals as well as the grazing was generally satisfactory, notwithstanding the prevailing drought conditions. There was an increase in the incidence of lumpy skin disease, while heavy animal losses occurred in Natal through nagana, where gall-sickness has also made its appearance.

Crops.—Good summer crops were realized in the Transvaal and Orange Free State, and the winter crops appeared very promising.

In the western, south-western and south-eastern Cape Province and in the Karoo the conditions did not appear favourable, and more rain was needed for the winter crops.

Producers Prices of Baconers.

OWING to increase in the cost of feedstuffs, but having regard also to their shortage so that pig production in the Union should at best be maintained, the Government has decided to increase producer's prices of baconers by 1d. per lb. dressed weight, viz. to 1s. 1d. per

lb. for first-grade baconers, and by $\frac{1}{2}$ d. per lb., viz to 10 $\frac{1}{2}$ d. per lb. for second-grade baconers. This increase came into force on the 15th of July. Consumer's prices of bacon and ham will be increased accordingly.

Crops Estimates.

Drybeans and Groundnuts, 1946.

THE final crop estimates for dry beans and groundnuts for 1946 have been based on reports received at the end of May.

The production of *dry beans* is estimated to be 348,000 bags in comparison with 237,000 bags for 1945.

Approximately 42 per cent. of the crop consists of haricot beans, 26 per cent. of kidney or butter beans, 15 per cent. of sugar beans and 8 per cent. of cowpeas.

The 1946 crop of *groundnuts* that will be marketed is estimated at 237,000 bags of 100 lb. unshelled, in comparison with 120,000 bags for 1945.

As a result of the great demand for oil seeds, there is an increase in the production of groundnuts in areas where, up to a few years ago, groundnuts were planted on only a very small scale. The most important areas where production is increasing are the Vaalhartz Irrigation area, Dundee in Natal, the north-eastern corner of the Transvaal and the Parys and Vredefort districts. The crop in these areas is estimated at 52,000 bags.

Estimate of Expected Kaffircorn and Potato Crops—1945/46 Season.

KAFFIRCORN (BAGS 200 lb.)—(EUROPEANS ONLY).

	Average production 1936-1945.	Final estimated production 1944-45.	Estimated production April 1946.	Estimated production May, 1946.
Cape.....	112,000	135,000	135,000	135,000
Natal.....	47,000	28,000	20,000	21,000
Transvaal.....	488,000	266,000	564,000	532,000
Orange Free State.....	118,000	130,000	59,000	101,000
UNION.....	765,000	559,000	778,000	789,000
POTATOES (BAGS 150-lb.).				
Cape.....	727,000	900,000	727,000	752,000
Natal.....	247,000	246,000	213,000	197,000
Transvaal.....	1,025,000	883,000	1,519,000	1,369,000
Orange Free State.....	530,000	432,000	452,000	567,000
UNION.....	2,592,000	2,461,000	2,911,000	2,885,000

Prices of Fertilizers.

THE following new maximum prices have been fixed for fertilizer types and fertilizer mixtures as from 1 July 1946. (The previous fixed maximum prices are given in each instance in brackets):—

	Maximum price per ton (2,000 lb.) in bags.	
	£ s. d.	£ s. d.
Superphosphate, 19 per cent.....	7 8 0	(7 13 0)
Superphosphate, 18 per cent.....	7 0 0	(7 5 0)
Superphosphate, 17·1 per cent.....	6 13 0	(6 17 6)
Superphosphate, 15·1 per cent.....	5 18 0	(6 1 6)
Phosphate rock and superphosphate mixture.....	5 18 0	(6 1 6)
Muriate of potash.....	23 7 6	(21 11 6)
Ammonium sulphate.....	20 0 0	(20 0 0)
Ammonium phosphate.....	23 5 0	(23 5 0)

Mixtures.

	MAXIMUM PRICE PER TON (2,000 lb) IN BAGS.			
	ORGANIC.		OTHERS.	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
A 0.14.6.....	—	—	9 3 0	(9 2 6)
B 2.12.6.....	11 9 6	(11 9 0)	10 9 6	(10 9 0)
C 2.12.2.....	9 16 0	(9 17 6)	8 16 0	(8 17 6)
D 3.13.3.....	12 1 0	(12 2 0)	10 11 0	(10 12 0)
E 4.12.0.....	11 19 6	(12 2 0)	9 19 6	(10 2 0)
F 4.10.6.....	13 16 6	(13 15 0)	11 16 6	(11 15 0)
G 6.10.3.....	15 11 6	(15 11 6)	12 11 6	(12 11 6)
H 8.10.0.....	17 6 6	(17 8 0)	13 6 6	(13 8 0)
J 3.15.2.....	12 6 0	(12 8 0)	10 16 0	(10 18 0)
K. 4.17.0.....	13 12 0	(13 16 6)	11 12 0	(11 16 6)
L 5.12.5.....	15 11 0	(15 11 0)	13 1 0	(13 1 0)

The above prices are free on rail seller's station, and on these farmers still receive a subsidy of £1 per ton.

As will be seen from the above fixed prices there is a slight decrease in the prices of superphosphate and rock phosphate.

The Union receives its supplies of rock phosphate mainly from French Morocco, and as a result of the recent devaluation of the French currency it was possible to purchase rock phosphate at a slightly lower price.

This, coupled with a slight decrease in freight charges, also made it possible to reduce the local selling prices of phosphates.

Prices remain unchanged in respect of ammonium sulphate which is procured mainly from Canada or the United States, while the price of muriate of potash, which is imported mainly from Palestine, even increased, due to the tendency in these countries for prices to continue rising.

Prices of fertilizer mixtures could also not be decreased all round, and in some instances were even increased, due to the rise in local manufacturing costs and also to the increase in the price of muriate of potash.

Index of Prices of Field Crops and Animal Products.

(Basic period 1936-37 to 1938-39=100.)

SEASON (1 July to 30 June).	Summer cereals.	Winter cereals.	Hay.	Other field crops.	Pastoral products	Dairy products.	Slaughter stock.	Poultry and poultry products.	Com- bined index.
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	
WEIGHTS.	19	13	2	3	34	6	17	6	100
1938-39	92	107	96	89	79	102	106	92	93
1939-40	86	107	77	95	115	105	106	89	103
1940-41	109	113	106	156	102	108	110	104	108
1941-42	121	134	143	203	102	131	134	145	123
1942-43	160	149	144	159	122	147	167	173	146
1943-44	169	172	137	212	122	154	182	204	157
1944-45	184	183	160	280	122	177	172	187	163
1945—									
January	184	183	177	250	122	159	173	206	163
February	184	183	171	235	122	180	171	225	164
March	184	183	182	245	122	180	171	237	165
April	184	183	173	246	122	180	169	263	166
May	199	183	173	287	122	184	163	272	170
June	199	183	190	320	123	184	170	262	172
July	199	183	191	315	118	210	175	210	170
August	199	183	191	333	118	210	179	190	169
September	199	183	187	372	118	210	183	165	170
October	199	183	189	383	118	210	187	165	171
November	199	190	194	379	118	204	187	173	172
December	199	190	194	341	117	204	183	202	172
1946—									
January	199	190	191	349	118	204	179	233	174
February	199	190	158	308	118	186	175	256	171
March	199	190	160	283	118	186	171	277	171
April	199	190	176	299	118	186	168	320	174
May	250	190	170	286	119	186	165	332	184
June	247	190	178	285	119	218	164	295	183

(a) Maize and kaffoorn.

(d) Potatoes sweet potatoes,
onions and dried beans.

(f) Butterfat, cheese milk and

(b) Wheat, oats and rye.

(e) Wool, mohair, hides and skins.

(g) Cattle, sheep and pigs.

(c) Lucerne and test hay.

(h) Fowls, turkeys and eggs.

Average Prices of Cabbages, Cauliflower and Tomatoes on Municipal Markets.

SEASON (1 July to 30 June).	CABBAGES (Bag). (a)			CAULIFLOWER (Bag). (a)			TOMATOES (Trays 15 lb.).			
	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.	Johannesburg.			
							N.M. No. 1.	Other.	Cape Town.	Durban.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1938-39	3 10	3 0	3 10	3 0	1 8	3 5	2 2	1 3	1 8	0 10
1940-41	5 10	4 8	7 1	3 11	4 3	5 3	2 7	1 6	2 1	1 2
1941-42	8 10	5 5	11 5	5 9	5 7	7 11	3 1	1 9	2 3	1 6
1942-43	5 6	5 11	9 1	5 0	5 9	7 6	3 4	1 10	2 1	2 7
1943-44	11 1	7 4	17 6	9 2	6 2	12 1	5 5	2 9	3 7	2 0
1944-45	9 7	6 11	13 5	7 5	6 6	9 8	4 1	2 0.	2 8	1 9
1945—										
January	8 0	4 9	15 8	6 3	—	—	6 1	2 6	2 7	2 2
February	7 8	8 6	22 4	9 5	6 11	—	3 0	1 2	3 1	1 1
March	8 5	10 5	24 1	8 8	—	8 0	3 4	1 5	2 5	2 4
April	8 7	7 11	14 8	7 7	9 7	11 4	3 4	1 5	2 6	1 7
May	7 6	5 4	11 2	7 3	6 5	10 10	4 0	1 10	2 4	1 10
June	8 11	4 3	10 6	11 7	7 7	14 10	3 11	2 1	3 0	1 1
July	12 2	5 4	11 0	12 3	5 7	11 0	3 7	1 10	2 9	1 2
August	12 0	9 7	8 11	10 0	8 2	12 3	5 2	3 2	3 4	1 5
September	12 2	11 7	10 8	11 8	9 6	14 10	6 7	3 1	3 10	1 10
October	10 1	12 1	16 3	17 0	5 9	11 0	6 2	2 8	3 1	1 8
November	10 9	9 11	16 0	12 9	8 6	—	5 7	2 8	4 0	1 6
December	14 2	9 10	17 7	26 0	3 6	—	3 0	1 1	3 11	1 1
1946—										
January	9 7	8 0	14 8	14 5	9 0	—	4 3	1 10	2 5	1 3
February	7 3	9 1	18 1	10 10	6 6	—	4 2	1 7	1 11	1 3
March	8 11	7 3	14 4	7 2	9 8	3 4	6 2	3 8	2 6	1 6
April	9 10	5 8	9 0	6 7	15 4	12 4	8 1	3 6	2 8	2 0
May	8 4	3 4	7 7	7 2	5 3	8 11	6 3	2 11	3 8	2 3
June	5 10	2 4	11 0	7 7	3 1	12 1	4 2	2 0	2 10	1 5

(a) Weights of bags vary, but on the average are approximately as follows: For cabbages—Johannesburg, 150 lb.; Cape Town, 105 lb., and Durban, 90 lb. For cauliflower—Johannesburg, 100 lb.; Cape Town, 85 lb. and Durban, 85 lb.

CROPS AND MARKETS.

Average Prices of Onions and Sweet Potatoes on Municipal Markets.

SEASON (1 July to 30 June).	ONIONS (120 lb.).						Sweet Potatoes. (120 lb.).		
	Johannesburg.		Cape Town.	Pretoria.	Durban.				
	Trans- vaal.	Cape.	Cape.	Cape.	Local.	Cape.	Johan- burg. Table.	Durban.	Cape Town.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1938-39	8 3	8 10	7 4	7 10	8 6	9 6	5 7	4 8	5 3
1939-40	6 3	9 10	7 3	9 11	9 8	10 5	5 7	5 9	5 0
1940-41	12 5	12 3	9 10	11 11	11 2	12 7	7 3	6 4	5 5
1941-42	10 5	13 11	10 4	13 10	13 0	14 3	9 10	7 1	8 4
1942-43	13 8	14 0	12 6	14 7	12 9	14 5	9 8	8 1	8 5
1943-44	16 2	18 9	15 1	17 4	19 1	19 2	12 0	10 9	10 7
1944-45	14 7	18 7	14 8	18 1	18 8	19 5	17 3	15 1	16 3
1945—									
January	12 9	13 1	9 11	14 8	12 3	13 5	18 2	7 8	14 7
February	13 5	13 10	9 9	10 4	12 2	14 0	16 0	8 1	10 8
March	13 10	15 2	11 4	14 9	18 9	17 0	12 6	9 6	12 5
April	17 8	17 5	14 6	16 9	12 6	17 8	9 11	7 5	9 1
May	16 4	17 11	12 0	18 0	19 11	20 10	10 4	7 1	11 4
June	20 3	17 11	14 4	18 4	15 4	18 1	9 4	8 2	9 4
July	16 7	18 7	15 5	16 8	17 7	20 5	10 4	8 8	12 4
August	18 7	13 4	15 7	18 3	16 0	19 4	11 3	8 0	12 1
September	16 1	17 7	16 1	19 11	19 3	20 5	15 0	12 11	14 2
October	10 8	14 5	12 11	14 8	10 4	15 10	19 0	15 6	17 0
November	12 3	9 3	13 0	—	14 3	13 10	19 11	19 1	21 3
December	14 8	15 3	15 6	17 10	16 11	15 7	17 1	14 6	17 7
1946—									
January	12 0	12 1	9 7	—	11 7	13 0	17 1	15 6	17 3
February	12 3	13 8	11 1	13 1	15 2	9 11	17 3	10 3	17 2
March	11 4	12 4	9 9	12 10	12 9	13 5	18 5	14 8	14 2
April	12 1	12 10	11 3	13 10	15 1	14 9	15 2	17 4	14 7
May	13 6	13 9	11 9	13 9	12 10	14 7	15 8	15 6	14 5
June	14 7	15 5	12 2	17 1	15 11	14 11	14 11	14 8	15 1

Average Prices of Green Beans, Green Peas and Carrots on Municipal Markets.

SEASON (1 July to 30 June.)	GREEN BEANS (Pocket 20 lb.).			GREEN PEAS (Pocket 20 lb.).			CARROTS (Bag). (a).		
	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1938-39	1 8	2 3	2 0	2 4	1 9	1 2	3 8	2 6	6 1
1940-41	1 11	2 9	1 5	2 8	2 4	2 3	5 9	4 11	13 4
1941-42	2 7	3 10	2 6	3 11	3 3	3 4	8 5	8 11	17 2
1942-43	3 1	4 3	3 0	3 3	2 10	3 9	5 1	8 9	13 2
1943-44	3 8	4 11	3 0	4 11	4 10	4 11	9 11	11 1	20 2
1944-45	3 7	5 1	4 1	4 9	4 1	5 5	8 3	9 11	19 10
1945—									
January	1 10	0 11	2 4	4 3	1 9	6 7	7 7	3 1	10 2
February	1 7	3 4	2 3	5 5	6 9	7 4	7 8	6 11	19 1
March	2 3	4 11	2 6	7 7	12 0	6 7	9 5	6 3	25 4
April	1 11	2 8	1 10	4 4	6 6	4 0	8 6	13 9	19 6
May	3 3	5 3	2 3	5 9	9 11	3 1	9 5	8 7	21 6
June	4 3	4 2	5 0	4 9	7 9	8 8	10 0	10 10	18 9
July	9 10	7 10	5 10	8 2	11 7	8 8	10 1	16 4	20 11
August	7 4	6 4	6 10	5 8	7 10	5 5	13 4	17 11	12 11
September	3 1	5 9	4 1	2 8	4 1	2 4	7 5	12 8	16 8
October	3 8	5 4	4 9	4 4	3 6	7 7	9 6	9 10	20 11
November	1 6	3 4	2 4	9 0	4 0	9 4	9 8	8 8	16 4
December	2 4	2 3	2 8	12 1	—	12 5	10 9	7 10	13 10
1946—									
January	3 4	1 11	5 6	8 8	10 11	14 7	9 8	6 2	16 0
February	1 11	—	2 3	6 5	—	6 4	7 3	7 11	14 1
March	2 10	1 1	2 5	6 1	—	3 4	8 10	8 1	23 10
April	2 7	3 4	3 1	5 7	—	4 10	10 2	9 3	24 2
May	1 9	3 0	2 2	7 2	3 10	5 10	7 1	6 3	13 8
June	1 10	2 0	2 8	4 8	4 1	5 7	4 2	7 6	11 7

(a) Weights of bags vary, but on the average are approximately as follows:—Johannesburg, 130 lb.; Cape Town, 90 lb.; and Durban, 120 lb.

Average Prices of Lucerne, Teff, Kaffircorn and Dry Beans.

SEASON AND MONTH (b).	LUCERNE (per 100 lb.).			Teff Johan- nesburg (a) 100 lb.	KAFFIRCORN in bags (200 lb.).		DRY BEANS (200 lb.) bags.		
	Johannesburg (a).		Cape Town 1st grade.		F.o.r. producers' stations.		Johannesburg (a).		
	Cape.	Trans- vaal.			K1.	K2.	Speckled Sugar.	Cow- peas.	Kid- ney.
1938-39.....	s. d. 3 10	s. d. 3 1	s. d. 4 0	s. d. 2 7	s. d. 13 1	s. d. 12 9	s. d. 25 0	s. d. 16 9	s. d. 24 2
1939-40.....	3 0	2 5	3 4	2 6	8 8	9 4	21 11	13 11	21 2
1940-41.....	4 2	3 5	4 3	3 3	15 6	17 0	30 0	16 8	27 11
1941-42.....	5 7	5 2	5 3	4 7	18 10	19 6	32 10	19 8	28 3
1942-43.....	5 5	6 0	7 4	5 5	24 10	24 10	34 0	25 8	24 2
1943-44.....	5 4	5 6	7 3	4 5	21 0	21 7	49 6	29 11	32 1
1944-45.....	6 4	5 4	7 2	4 9	18 8	18 8	88 7	39 6	70 6
1945—									
January.....	7 3	5 7	7 3	4 1	23 1	23 1	118 8	45 11	98 2
February.....	7 0	6 9	7 6	—	22 0	22 0	122 3	45 3	95 3
March.....	7 2	5 10	7 3	5 5	22 0	22 0	107 9	42 11	89 3
April.....	6 10	—	7 8	5 2	22 0	22 0	109 11	53 4	104 8
May.....	6 9	5 7	7 6	5 5	20 6	20 6	111 1	61 7	97 1
June.....	7 6	6 9	7 9	5 8	20 6	20 6	102 2	67 11	95 2
July.....	7 6	—	7 9	5 9	20 6	20 6	105 8	67 1	80 10
August.....	7 6	—	7 9	5 9	20 6	20 6	93 7	66 3	80 7
September.....	7 4	—	7 9	5 9	20 6	20 6	87 0	67 2	74 8
October.....	7 5	7 6	7 0	5 9	20 6	20 6	91 2	70 8	68 3
November.....	7 6	6 9	7 3	6 6	20 6	20 6	106 3	68 7	79 1
December.....	7 6	—	7 3	—	20 6	20 6	104 3	61 7	69 6
1946—									
January.....	7 6	—	8 1	5 9	20 6	20 6	103 4	68 6	75 4
February.....	6 0	5 10	8 1	5 9	20 6	20 6	90 3	69 3	69 4
March.....	6 2	5 3	7 4	5 4	20 6	20 6	86 8	61 11	63 7
April.....	7 0	5 6	7 4	4 11	20 6	20 6	91 4	51 0	74 3
May.....	6 10	5 1	7 6	4 6	72 1	72 1	90 6	52 11	75 7
June.....	7 3	5 6	7 6	4 5	60 8	60 8	94 2	45 0	66 1

(a) Municipal Market

(b) Seasonal year for kaffircorn,
1 June-31 May.

Dry Beans, 1 April-31 March;

Lucerne and teff, 1 July-30
June.

Prices of Avocados and Papaws on Municipal Markets.

SEASON	AVOCADOS (Per Tray). (a)				PAPAWS. (b)					
	Cape Town.	Durban.	Johannesburg.		Cape Town Std. Box.	Durban. Tray.	Johannesburg.		Port Eliza- beth Std. Box.	Bloem- fontein Std. Box.
			Ordinary.	N.M.			Ordinary Std. Box.	N.M. Std. Box.		
1938-39.....	s. d. 1 6	s. d. 0 11	s. d. 1 3	s. d. 1 11	s. d. 2 0	s. d. 0 10	s. d. 1 7	s. d. 2 0	s. d. 2 0	s. d. 1 3
1939-40.....	2 1	1 2	1 9	2 11	2 3	0 10	1 4	1 9	1 11	1 6
1940-41.....	1 10	0 10	1 5	2 4	2 1	1 1	1 9	2 2	2 3	1 9
1941-42.....	2 4	1 7	2 1	3 4	2 5	0 10	1 10	2 1	1 11	2 0
1942-43.....	3 1	1 8	2 10	4 3	3 2	1 2	2 1	2 7	2 2	2 0
1943-44.....	4 1	1 6	3 7	5 3	3 2	1 5	2 5	3 5	3 3	2 7
1944-45.....	—	—	—	—	3 4	1 6	3 1	4 1	3 5	3 0
1945—										
January.....	3 11	—	4 10	7 2	3 10	1 5	4 1	4 9	6 5	3 6
February.....	2 0	2 3	2 6	4 3	2 8	1 10	5 11	7 6	—	5 5
March.....	2 0	0 11	2 3	4 4	4 10	1 10	5 4	6 9	—	4 10
April.....	1 10	0 10	2 7	3 11	4 9	1 8	4 5	6 2	4 11	4 6
May.....	2 4	0 9	2 5	4 3	4 7	1 6	3 7	5 0	4 7	2 11
June.....	2 4	2 5	2 10	6 1	4 4	1 11	3 7	4 6	4 0	3 6
July.....	3 4	2 4	3 10	5 8	4 2	1 9	4 10	5 9	4 11	5 0
August.....	6 8	3 10	6 2	7 4	5 10	1 5	4 10	6 1	5 3	5 0
September.....	5 4	3 1	6 5	7 0	3 3	1 4	3 3	4 1	2 7	3 6
October.....	7 2	3 8	8 1	7 4	2 7	1 5	2 5	3 5	2 2	2 4
November.....	9 5	3 6	6 6	8 0	3 6	2 0	2 7	3 7	6 7	3 2
December.....	7 8	1 0	7 1	—	4 4	1 0	3 11	5 7	5 10	3 6
1946—										
January.....	8 1	1 8	5 10	9 2	3 10	1 6	4 5	7 11	6 4	3 11
February.....	3 4	0 10	3 1	5 0	2 10	1 5	7 1	5 6	5 6	4 7
March.....	2 11	3 7	2 8	4 0	—	1 1	6 6	7 8	6 4	5 8
April.....	2 8	1 11	3 4	4 9	5 5	1 1	5 6	7 11	6 3	4 6
May.....	3 0	1 10	3 7	5 5	5 1	1 1	4 9	5 8	4 7	4 2
June.....	3 6	2 3	4 5	6 4	3 8	2 5	4 10	5 9	5 2	4 0

(a) Season 1 January to 31 December.

(b) Season 1 April to 31 March

CONTENTS



	PAGE
EDITORIAL:	
The Nagana Campaign in Zululand	575
Information on Horse Breeding	576
SPECIAL:	
Hybrid Maize Seed (F. X. Laubscher)	585
ANIMAL HUSBANDRY:	
The Horse on the Farm (Dr. P. J. Schreuder and F. B. Wright)	577
The Handling of Milk and Cream on the Farm (Division of Dairying)	595
The Breeding Value of Friesland Bulls in S.A.—III. Ceres Lindbergh (Prof. F. N. Bonsma)	620
POULTRY:	
Classing of Poultry or Culling of Non-producers (P. J. Serfontein)	601
Central Egg-laying Competition at Glen (J. A. de Beer) ...	628
MISCELLANEOUS:	
Pentachlorophenol Solutions in Wood Preservation (P. M. D. Krogh and F. G. C. Tooke)	590
To Farmers and Landowners	594
Control of Cochineal in Spineless Cactus Plantations (Dr. F. W. Pettey)	615
Nursery Quarantines	619

[NOTE.—Articles from *Farming in South Africa* may be published
provided acknowledgment of source is given.]

FORD'S FOR SEEDS—A. FORD & Co. (Pty.,) Ltd.

AGRICULTURAL SEEDSMEN.

SEED CONTRACTORS TO THE UNION GOVERNMENT,
P.O. BOX 5701. CATALOGUES FREE JOHANNESBURG.

Horse Improvement Scheme "B".

SEASON 1945/6.

DURING the 1945-6 stud season the number of mares served by Government stallions, as compared with previous years, was as follows:—

Stallion.	1938/ 1939.	1939/ 1940.	1940/ 1941.	1941/ 1942.	1942/ 1943.	1943/ 1944.	1944/ 1945.	1945/ 1946.	Total.
Fercheron.....	33	22	97	94	107	108	193	203	660
Thoroughbred.....	30	65	122	84	60	86	116	84	647
Jacks.....	27	26	8	9	5	10	6	10	95
TOTALS.....	90	107	227	187	172	204	315	295	1,402

The numbers are somewhat smaller than those of last year, a fact ascribed to the nation-wide drought which was responsible for the temporary abandonment of the scheme at Glen College, and which caused many mares to be sent to the different stations in such poor condition that a large percentage did not hold the horse.

The scheme met with its greatest success in the Eastern Transvaal highveld and in the Western Transvaal where the studs at Ermelo and Potchefstroom were taxed to capacity.

In view of the important part played by mules in our farming economy it is surprising that more use was not made of the very superior jacks which the Department makes available to farmers.

It was pleasing to note that the type of mare sent to the different studs shows a steady improvement. It is unfortunately not possible to arrive at the foaling percentage of the mares served, as many farmers ignore all requests for information on this score.

Government stallions are available to serve mares belonging to members of the public at a fee of £1. 1s. per mare at the following institutions:—

Percheron Stallions:

Grootfontein College of Agriculture.
 Potchefstroom College of Agriculture.
 Glen College of Agriculture.
 Cedara College of Agriculture.
 Stellenbosch-Elsenburg College of Agriculture.
 Ermelo Veterinary Research Station.
 Athole Pasture Research Station (Ermelo).
 Pasture Research Station, Dohne.
 Meadows Industrial School, Dewetsdorp.
 Oakdale School of Agriculture, Riversdale.

Thoroughbred Stallions:

Potchefstroom College of Agriculture.
 Glen College of Agriculture.
 Ermelo Veterinary Research Station.

Jacks:

Potchefstroom.

Further information in regard to the scheme may be obtained from the Principals of the different agricultural colleges and schools, and from the Officers in Charge of the abovementioned institutions.
 (Director of Agricultural Education and Research.)

FARMING IN SOUTH ... AFRICA

VOL. 21

SEPTEMBER 1946

No. 246

Editorial:

The Nagana Campaign in Zululand.

AT THE Pan-African conference of scientists held in Pretoria in 1929 it was resolved that game constitutes the most important reservoir of the Trypanosomes, and the most important source of food to the open forest tsetse flies, of which *Glossina pallidipes* is the most important transmitter of nagana in Zululand. The trypanosomes which cause the fatal disease nagana in stock, may be harboured by wild animals which do not die of this disease, nor show any clinical symptoms. When tsetse flies feed on such animals, the flies may pick up infection and thus are able to transmit the disease to domestic animals.

The dual rôle played by game, firstly as carriers of the infection and secondly as the source of food supply for the flies, has prompted the idea of game destruction as a method of combating nagana in Zululand. Destruction, however, is not carried out wantonly, but under strict Government control, and is confined to well-defined areas only. Records are kept of all game destroyed and ammunition expended. Most of the meat and skins are properly disposed of. Recent game surveys definitely show that the unprecedented simultaneous spread of the tsetse fly to the extreme limits of the potential fly belt in Zululand cannot be attributed to any undue migration of game as a result of these operations. Periodic dispersions of fly from high density areas have been observed on former occasions. Some are inclined to believe that it stands in relation to conditions of extreme drought. The extensive increase of bush throughout Zululand has undoubtedly widened the dispersion area. Fly surveys are being undertaken to ascertain the extreme limits of dispersion so that the fly can be dealt with adequately. At the same time the Government is making an attempt to save as much of the game as possible, and for this reason other far more costly measures, and on an unprecedented scale, are being adopted to preserve in perpetuity all species of animals in the Nature reserves of Natal earmarked for that purpose.

It was thought that the Harris Fly Trap would prove to be effective in destroying the tsetse fly, but recent exhaustive experiments have shown that the trap probably only accounts for a small percentage of the flies actually present. According to experience in other parts of Africa, attack on the breeding places of the tsetse fly is one of the important measures in controlling and eradicating the fly, and in view of this the Government has decided to intensify and extend, at considerable cost, the bush-clearing operations which were commenced in 1943 in order to create barriers to control the dispersion of flies from the high fly density areas in the reserves. These barriers should be not less than two miles in width.

The latest method of attack on the tsetse fly, viz. the application of D.D.T., may still be the deciding factor in the eradication of the pest. A good deal of preliminary work has already been done

to ascertain the best method of attack from aircraft or from the ground, and D.D.T. in sprays or in smoke has already been effectively applied. The female tsetse fly deposits a single larva at intervals of approximately 14 to 18 days. The larva penetrates the soil to a depth of about 1 inch and within a short period forms a pupa. The hatching of these pupae may be delayed for a period up to two months. Although a female does not deposit more than 12 larvae, methods had to be devised by means of which flies emerging from these pupae can be destroyed before depositing further larvae. It is therefore estimated that the application of D.D.T. should be repeated at intervals of a fortnight over a period of about 2 months.

From information received, the new drug Phenanthridinium 1553, apparently gives excellent results in the treatment of nagana in cattle, and one dose usually has the desired effect. Since June the Government has been making representations for the immediate supply of adequate quantities of this drug, but there appears to be a great demand for this drug in nagana areas outside the Union. Up to the present only small quantities have been received, and these have been distributed on a *pro rata* basis to all farmers' associations in infected areas. In the meantime farmers have been advised to use tartar emetic.

The nagana campaign in Zululand is from time to time reviewed by the Nagana Advisory Committee under the Chairmanship of the Magistrate of Empangeni. On this Committee there are representatives of the Departments of Agriculture, Native Affairs, and Lands, the Natal Provincial Council, and all the farmers' associations in the potential fly belt. Many useful resolutions have been framed and passed for the benefit and further action of the central Government.

Information on Horse Breeding.

THE horse and the dog are man's most faithful and unselfish friends, but our expanding population and the consequent urban congestion have to such an extent banned the former from our cities and towns that it must now be content to prove its value almost exclusively in rural areas. The "town horse" is noticed only as a unit of labour, and to the man in the street constitutes merely an impediment and not an object of admiration. The motorist, craving ever greater speed and space, has declared this animal a nuisance. No wonder our younger generation simply does not know or admire the horse. Even the average farm lad cannot ride a horse; he is a stranger to saddle, harness or cart. Our country is losing its traditional love of horses, for "out of sight, out of mind". Our younger generation is fond of reading, and books in which horses play a prominent rôle are eagerly devoured. We can therefore assume with a fair amount of certainty that the young people of our day would be keen to learn more about horses and to love them. What is lacking, however, is instruction in riding and the treatment and handling of the horse and its equipment. But our young folk are shy of the older generation, which is prone to deride their ignorance.

Now those lovers of horses, Dr. Schreuder and Mr. Wright, have begun a series of articles, one of which appears in this issue, to inform old and young about the horse, its ancestry, its economic value, its training, handling and care. In short, everything needed to understand and use a horse to the best advantage, will be discussed in this interesting series.

The Horse on the Farm.*

Dr. P. J. v. d. H. Schreuder and F. B. Wright, Senior
Professional Officers (Horses).

ALL through the ages the horse has been closely associated with human activities. It furnished the main motive and tractive power in the migration of nations, the campaigns of Attila, Genghis Kahn, Alexander the Great and Napoleon, and even in the armies of modern times.

With us, too, the South African commando horse was famous not only in our own wars but also in the service of the British Army in India and in the Crimea where it was declared "the best in the world".

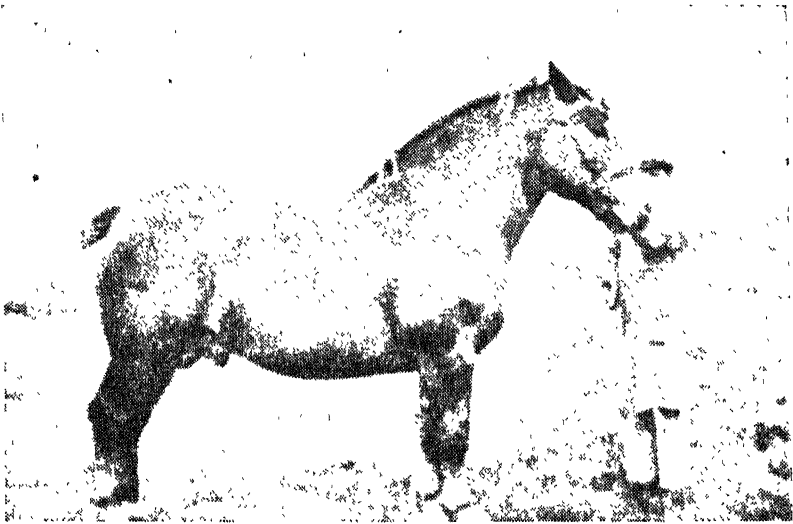


FIG. 1.—Suffolk stallion representing weight and strength. Contrast with light, active saddler type in Fig. 2.

In peace time the horse exercised a civilizing influence and was the main force in the agricultural development of the oldest and most prosperous countries of the world. To this day it is still closely associated with intensive profitable production on the richest soils of old established nations.

Although we live in the machine age, there is still an indispensable place for the horse in the agricultural and industrial life of practically all progressive nations. Farmers who own teams of horses or mules are in a strong position since they are independent of machines, their spare parts, fuel and other adjuncts—all of which must be imported and mean so much additional expense to the South African farmer.

In spite of all sorts of mechanical devices, there are still numerous operations on farms and elsewhere in which equine power is more applicable and economical.

* This is the first of a series of articles which will appear in *Farming in South Africa* and be issued later in the form of a bulletin:

The best results are obtained where motive and tractive power are complementary or co-operative. Horse and mule teams can save costs in the performance of all sorts of tasks—working compost pits, planting, mowing, carting small loads, and numerous other jobs which would be too costly if carried out by imported mechanized power.

The use of tractors would be ruinous on small holdings, settlements and intensive propositions such as orchard and flower-gardening propositions intensively worked and averaging up to 100 morgen. One never sees tractors on the little farms of France, Holland, England, Denmark and other European countries.

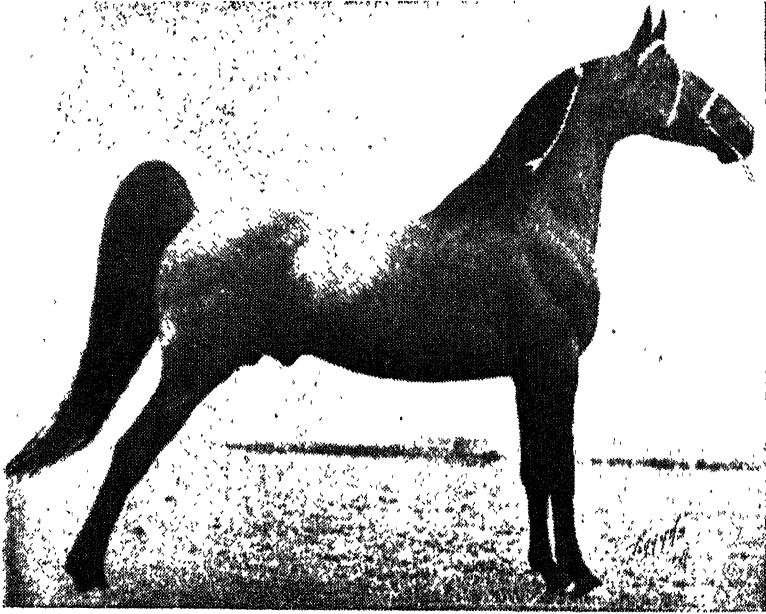


FIG. 2.—American saddler representing light and active type. Contrast with heavy draught type in Fig. 1.

U.N.R.R.A. estimates that at least 7,000,000 horses are required to build up the ruined farming industries of starving Europe. British farmers pay up to £280 for draught-type geldings. The U.S.A. has imported 143 horses from Europe for the improvement of her remount horse stock. It is admitted that the horse population of several countries has decreased, but the value of utility types has increased.

When the supply of imported mechanized power was threatened by war conditions, South Africa had to turn to its own natural, national farm power and the reviving interest in horse-breeding during the past two decades was given an additional stimulus, so much so that an unprecedented demand for all classes of utility types of horses was created. Draught-type stallions fetched up to £350 and mares up to £325, while South African bred saddler colts realized as much as £800. The Allies spent over a million pounds on horses, mules and donkeys in South Africa, while most African states, India and even Palestine are seeking useful horses and mules in South Africa.

Throughout the Union farmers and industrialists have re-discovered the horse and mule. Fruit-, wine- and grain-farmers, sugar planters, florists, municipalities, settlers, road boards and other corporations make demands for classes and types that cannot be met.

The South African Horse Stock.

When it was decided to establish the first white settlement in South Africa, the Dutch East India Company arranged to supply van Riebeeck with horses. The nearest point from which to carry horses with safety on small sailing vessels was the Dutch East

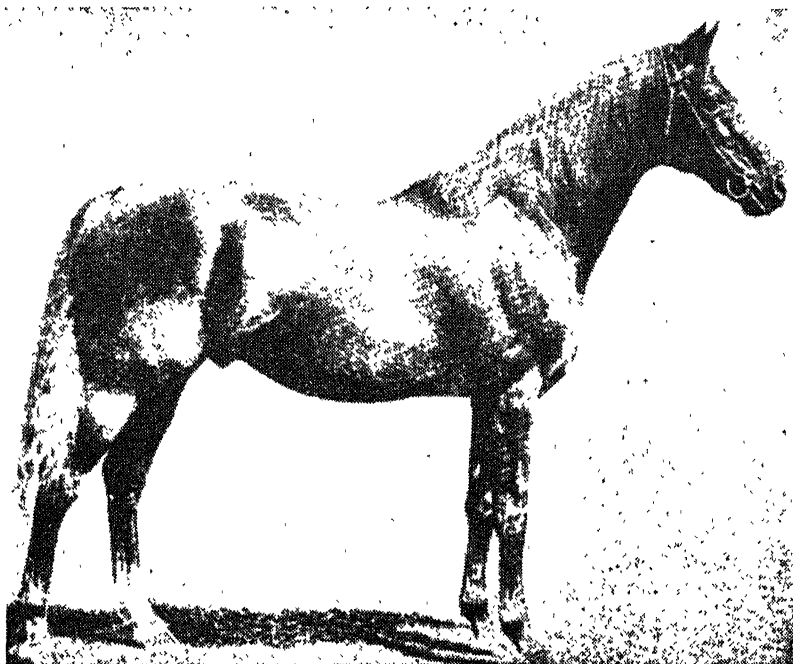


FIG. 3.—“Bend Or”, a Thoroughbred, typical of the type imported during the twenties and thirties of last century by Lord Charles Somerset. The blood of this type flowed in many of the importations of the day.

Indies. A troop of Javanese ponies was therefore imported and arrived in Table Bay about the same time as van Riebeeck and his first settlers. On his charger, “Rode Vos”, van Riebeeck awed the natives with the might of the white man, while horse wagons and commando horses furnished the developing and civilizing forces of our first forbears for almost two centuries. These Javanese horses were descendants of the Arab steeds imported by the princes and merchants of the rich Orient.

Successive governors at the Cape imported high-class Arabian stallions from time to time so that from 1652 to 1810, a period of 158 years, our horse stock was mainly of Arabian origin. In 1769 large batches of remounts, our first pastoral products, were exported to the British Armies in India. Successive commanders declared them “the best in the world”. In 1810 English “blood

horses", shortly afterwards known as Thoroughbreds and bred to perfection on Arab foundations, found their way to the Cape.

From then on began South Africa's fame as a horse-breeding country. Lord Charles Somerset, Governor of the Cape, and leading farmers introduced large numbers of the choicest Thoroughbred blood into our large studs that spread all over the Cape and southern parts of the newly founded Orange Free State Republic.

Horse power furnished the main source of motive and tractive power and the trade with India and elsewhere was good. Settlements spread far and wide, other lucrative farming enterprises were established, and ox-wagons, mule teams and railways wormed their way into the hinterland, where the world's largest diamond and gold mines were discovered. Meanwhile, towards the middle of the 19th century, various causes and their effects combined to check the progress made to date. The Suez Canal was opened, merino-, angora-, ostrich- and cattle-farming became lucrative enterprises. Successive visitations of horse-sickness decimated large studs. The overseas trade in remounts and race horses was lost, and our horse stock deteriorated considerably. To retrieve the position, large batches of stallions of the newer fashionable breeds—Hackneys, Cleveland Bays, Roadsters and "cart horses" were introduced. This indiscriminate mixing of breeds broke down much of the sterling qualities of the Anglo-Arab type whose famed prototype, the Hantam horse, existed up to the close of the century. The war of 1899-1902 further destroyed what was left of our once famed horse stock.

To save the fast deteriorating position the Government established several large stud stations throughout the country for the use of farmers. Some of these stations maintained up to 25 stallions, mainly Thoroughbreds, but also a few Arabs, Hackneys and an occasional draught-breed stallion.

In 1910 the Government also established the first studs of draught horses. Studs of Clydesdales and, soon after, of Percherons were founded at the agricultural colleges which were established at the beginning of 1900.

Unification of the four provinces of South Africa brought a new outlook and hopes for progress and established settlement. Good progress was made in all directions. Horse-breeding affairs were just on the mend when World War I arrested this progress. The aftermath of war with all its extravagance and bewilderment brought the motor and motor-mindedness. Farmers and others lost their perspective and the horse was sacrificed to the craze for speed and relegated to the native. A faithful few, however, remembered the friend of pioneering days. It was soon realized that no country, least of all a livestock country, could do without such a valuable branch of the animal industry.

Gradually isolated interest revived into nation-wide interest. Horse breeders began to stand together and became more articulate. The first horse-breeders' associations were established. The Government took cognizance of these reviving interests and encouraged rehabilitation schemes. Studs were strengthened by fresh importations and a Horse Improvement Scheme for farmers was introduced by the establishment of stud stations for farmers.

Sound beginnings were being made for finding a place for the horse in our agricultural industries when once again another World War seriously interrupted rehabilitation measures.

Types of Horses for South Africa.

After the above brief review of the historical and economical foundations of our horse stock, we may now take stock of modern trends of productive and economic agricultural development and find what types of equines will fit in best and serve us best.

In the older established European countries, and also in Canada, Australia, New Zealand, the United States of America and South America where the various breeds of horses are of high standard, efficiency and quality, there is hardly ever any talk of competition from mechanized power. Rather is there co-operative, complementary adjustment. Mechanical power is applied where horse-flesh will be tortured, and the horse is used where it is more economical and where tractors cannot go.



FIG. 4.—Photograph of a "Boer" mare taken at the age of 20 years. Note good, honest head, quality, substance, conformation, strength of loin and extreme soundness of legs. This mare was driven as one of a pair for 6 years through a mountain pass (Garcia Pass, C.P.), and was still an outstanding harness horse at the age of 20 years.

The most highly mechanized nation, the United States of America, is also one of the world's greatest breeders and users of horses. The Americans, with their intuitive sense for utility, are today producing most fruitful specializations in their light horse stock—the showy park-riding Saddlers, the useful cow-punching Quarter Horse, the plantation checking Tennessee walking horse, and the ceremonial sporting Golden Horse (Palomino). In Thoroughbreds, Arabs and Morgans they produce and use the best, while Percherons make up sixty per cent. of all their pure-bred horses. Mechanized power has not blurred or perverted their perspective as regards the place of the horse in their economic life.

It is readily admitted that in other countries light harness breeds have been largely displaced by the motor car. In South Africa, the small demand for light harness horses is readily met by selections from the saddle types. We find, however, a popular

and useful type of wagon horse—the Cape wagon horse or “Bolandse waperd”—in the south-western sections of the Cape Province.

This type was developed from the harness breeds of the nineties—Hackney, Flemish, and Cleveland Bays, with a dash of Clydesdale blood. The future of the breed hangs in the balance owing to the disappearance of the parent breeds. Some of the prominent breeders of this type are using Percheron stallions with most gratifying results, since the Percheron existed for a long period as one of Europe's finest coaching breeds. The Cleveland Bay, that once had a footing with us and is being generally revived in the U.S.A., may assist in the rehabilitation and establishment of this type so unique in the Cape farming districts. We have also created the Basuto Pony once famed as an excellent polo pony here and abroad. The propagation of types and breeds, however, is a matter of demand.

For our own use and the overseas demand a good light saddle type has a good future. The nation-wide schemes for soil conservation and economy farming demand intensive propositions with lower costs and higher production. For this purpose the heavier draught types are eminently suited and are increasingly favoured, especially on smaller farms intensively worked for higher production.

Selection and Judging of Horses.

The selection of horses for different utility purposes is based on a sound knowledge of all the phases of form and function in the horse. One should know all the body points and through study and experience know the purpose and value of each, the various unsoundnesses or defects, and the composition of the desired points into the correct and standard conformation for a particular type or breed. We are guided by carefully composed standards of excellence, scale of points or score cards. They teach us to do our judging in a logical and critical manner.

The score cards given here for light and heavy types of horses draw attention to the different body parts and features in a logical order. They stress the comparative value of points, not only in each type but also in the individual. Splints, curbs, thick shoulders, etc., which may be minor blemishes in the heavy or “work” horse doing his work at a walk, become serious defects in the light faster-moving horse, the remount, the racer and the light harness horse; but one always makes sure that the sum total of points gives proof that the draught horse's limbs are dependable and of high quality, since the animal's wearing and working qualities depend very largely on the character of its limbs and feet. Whatever the service, one is guided by the saying “No foot, no horse”.

The score card helps the student or judge to see every part of the horse and not merely the animal; a close study of parts gives a true estimate of the whole.

The successful breeder and user of horses must have an “eye”, or develop and “eye”, for what constitutes a good horse.

A mental picture as well as an intelligent conception of what constitutes a “perfect” horse must be clearly defined in one's brain. All judging must be based on this correct conception and standard for each breed or type. Carefully study the following scale of points; each point must be scored on a percentage basis. If the full value of a point is 10 and the horse judged cannot gain

THE HORSE ON THE FARM.

10, then that point must be reduced by 10 or 20 per cent. and the horse awarded 9 or 8 points. The cut of 1 or 2 points is based on a comparative basis and not on guessing or an arbitrary whim.

(a) For Light Horses.

Scale of Points.	Perfect Score.	Student's Score.
GENERAL APPEARANCE : 32.		
Height : 14-2—16 hands.....	3	
Form : Symmetrical, smooth, stylish.....	3	
Weight : 1,000 lb. and upwards to 1,200 lb.....	3	
Quality : Bone clean, firm, indicating sufficient substance ; tendons prominent, fine ; hair and skin fine.....	3	
Temperament : Active ; disposition kind. In stallion masculinity, strong and arched neck, character in head ; in mare femininity.....	3	
Action : Trot : Rapid, straight, regular, fairly high.....	12	
Walk : elastic, quick, balanced.....	5	
Objections : Lacking in energy, finish, and quality ; hide-bound, staring coat. Ungainly, faulty, or sluggish gait ; action too low		
HEAD AND NECK : 8.		
Head : Lean, straight.....	1	
Muzzle : Fine ; nostrils large ; lips thin ; even teeth, sound..	1	
Eyes : Full, bright, clear, large.....	1	
Forehead : Broad, full.....	1	
Ears : Size medium, pointed, well carried, not far apart.....	1	
Neck : Muscled ; crest high ; throat-latch fine ; windpipe large.	1	
Objections : Thick, beefy head ; short, beefy neck, thick at throatle, long at crest, ewe-necked ; dished or too full face ; sunken, small, vicious eyes ; lop-eared.		
FOREQUARTERS : 23.		
Shoulders : Long, smooth, well muscled, oblique, extending into back.....	2	
Arms : Short, thrown forward.....	1	
Forearms : Muscled, long, wide.....	2	
Knees : Clean, wide, straight, deep, strongly supported.....	2	
Cannons : short, wide ; tendons large and set back.....	2	
Fetlocks : Wide, straight.....	1	
Pasterns : strong, angle with ground 45°.....	3	
Feet : Size medium, even, straight ; horn dense, frog large, elastic ; bars strong, sole concave, heel wide.....	6	
Legs : Viewed in front, a perpendicular line from the point of the shoulder should fall upon the centre of the knee, cannon, pastern, and foot ; from the side a perpendicular line dropping from the centre of the elbow joint should fall upon the centre of the knee and pastern joints and behind hoof.....	4	
Objections : Narrow, rounded, too upright shoulders ; sunken, narrow, contracted chest. Sprung or calf-kneed ; weak, crooked cannons ; short, round, cut in below knee, too straight and short or too long and weak pasterns ; too small feet ; narrow, contracted, low heels.		
BODY : 10.		
Withers : Muscled, well-finished at top.....	1	
Chest : Deep, low ; girth large.....	3	
Ribs : Long, sprung, close.....	3	
Back : Straight, short, broad, muscled.....	3	
Loin : Wide, short, thick, strong, and smooth coupling.....	1	
Underline : Long ; flank let down.....	1	
Objections : Too lengthy barrel ; long and loose coupling ; sunken loin ; cut up too high in flank.		
HINDQUARTERS : 22.		
Hips : Smooth, wide, level.....	2	
Croup : Long, wide, muscular.....	2	
Tail : Attached high, well carried.....	1	
Thighs : long, muscular, spread, open angled.....	3	
Quarters : Heavily muscled, deep.....	3	
Gaskins (or lower thighs) : long, wide, muscular.....	3	
Hocks : Clearly defined, wide, straight.....	3	
Cannons : Short, wide, tendons large, set back.....	3	
Fetlocks : Wide, straight.....	1	
Pasterns : strong, sloping.....	2	
Feet : Size medium, even, straight, horn dense ; frog large, elastic ; bars strong, sole concave ; heel wide, high.....	4	
Legs : Viewed from behind, a perpendicular line from the point of the buttock should fall upon the centre of the hock, cannon, pastern, and foot ; from the side, a perpendicular line from the hip joint should fall upon the centre of the foot and divide the gaskin in the middle ; and a perpendicular line from the point of the buttock should run parallel with the line of the cannon.	4	
Objections : Short or steep croup ; tail set too low, straight, and stiff ; narrow thick, puffy hocks, cow-hocked, sickle-hocked ; too straight and short or too long and weak pasterns ; too small feet ; narrow, contracted, low heels.		
TOTALS.....	100	

(b) For Draught Horses.

Scale of Points.	Perfect Score.	Student's Score.
GENERAL APPEARANCE : 28.		
Height : 15-2 hands and upwards.....	3	
Weight : 1,600 lb. and upwards.....	3	
Form : low set, wide, deep, massive, well proportioned.....	3	
Substance : Bone ample ; joints broad.....	3	
Quality : Bone clean ; tendons and joints well defined ; skin and hair fine ; head refined.....	3	
Temperament : Vigorous ; disposition good ; appearance intelligent.....	3	
Action : Trot : Free, regular, powerful, easy.....	4	
Walk : Straight, snappy with long stride.....	6	
Objections : Too sluggish in temperament, lacking in quality and style ; low-headed and awkward in gait ; low action ; coarse shaggy coat ; hide-bound.		
HEAD AND NECK : 8.		
Head : Large ; features clean-cut ; jaw deep ; angle of jaw wide	1	
Forehead : broad, full.....	1	
Muzzle : Broad ; nostrils large ; lips thin ; even trim.....	1	
Eyes : Orbit prominent, large, bright, clear.....	1	
Ears : Size medium, pointed, set close, alert.....	1	
Face : Strong.....	1	
Neck : Medium to long, muscular, well arched, throat clean-cut ; windpipe large.....	2	
Objections : Narrow, thick beefy head ; dishd face ; small, sunken, vicious eyes ; too short and thick neck ; long at crest ; ewe-necked.		
FOREQUARTERS : 22.		
Shoulders : Sloping, smooth, muscular, extending well into back	2	
Arms : Short, muscular.....	2	
Forearms : Strongly muscled, wide, long.....	2	
Knees : Broad, deep, straight, strongly supported.....	2	
Cannons : Short, broad, flat ; tendons strong and well defined and set well back.....	2	
Fetlocks : Wide, strong, straight, well supported.....	1	
Pasterns : Oblique, strong, clean, medium length.....	2	
Feet : Large, round, not turned in or out ; heel wide and open, wall dense and clean ; bars strong ; frog large and elastic.....	6	
Legs : Perpendicular when viewed from front and rear and well placed.....	3	
Objections : Narrow, crooked, weak knees ; round spongy cannons, deficient in size ; short, stiff pasterns ; flat, shelly, narrow, contracted feet.		
BODY : 11.		
Withers : Well defined, muscular.....	1	
Chest : Wide, deep.....	2	
Back : Short, broad, strong.....	2	
Loin : Short, broad, strongly coupled.....	2	
Ribs : Long, well sprung, close ; barrel large.....	3	
Flank : Deep and full, with low underline.....	1	
Objections : Narrow, sunken chest ; narrow barrel ; ribs too straight ; loose coupling ; sunken and narrow loin ; high flank ; too steep and short croup.		
HINDQUARTERS : 31.		
Hips : Wide, muscular.....	2	
Croup : Long, wide, muscular, level or slightly drooping.....	3	
Tail : Well set, full, fine in quality.....	1	
Thighs : Muscular, deep.....	2	
Stiles : Muscular, well set.....	1	
Gaskins : Wide, muscular.....	1	
Hocks : Deep clean-cut, straight, wide, strong, point prominent.....	2	
Cannons : Short, broad, flat, clean ; tendons well defined.....	6	
Fetlocks : Wide, strong, straight, well supported.....	2	
Pasterns : Oblique, strong, clean, medium length.....	1	
Feet : Large, round, not turned in ; heel wide and open ; wall dense and clean ; bars strong ; frog large and elastic.....	2	
Legs : Perpendicular when viewed from rear and well placed.....	6	
Objections : Narrow and too puffy or meaty hocks ; deficiently muscled gaskins and stiles ; coarse stiff tail.	3	

The light and the heavy types are fully discussed. Suffice it to say here that the ability of a horse to perform his particular kind of work depends upon three general principles.

Constitution and good health.—Heart, lungs, digestion and circulation must be such as to ensure endurance, vitality and stamina.

Hybrid Maize Seed.

F. X. Laubscher, Research Officer, College of Agriculture,
Potchefstroom.

AT the moment the subject of hybrid maize seed is enjoying considerable interest. Journals and newspapers publish the amazing success obtained with this venture in the U.S.A. The hybrid maize seed industry is one of the most important farming business undertakings in America and is surpassed only by the implement business in volume and financial turnover. The contribution of hybrid seed to the American national economy by virtue of its increased yielding ability is estimated to be £500 million for the last four years only.



Inbred maize lines ready for self-pollination.

[Photo: Dr. A. R. Saunders.]

On an average, yield increases of about twenty per cent. over those of standard varieties are obtained, while the hybrids are much more resistant to drought and rot diseases, have stronger root systems, and are much more uniform than the varieties commonly grown.

All these facts are known to a wide circle of readers, and producers put themselves this question: Why cannot we also produce from such hybrids? And consumers argue: If our country were not so behind the times, the food shortage might have been prevented by the use of hybrid maize. It is very clear from numerous enquiries made regarding this matter that one crucial fact entirely escapes recognition, viz. that the creation of hybrid seed maize must be considered as one of the most successful applications of science and hence certain of its phases are of a highly technical nature.

Hybrid Seed Production a Complicated Process.

Many seem to think of hybrid maize as if it were a variety which can be imported to give increased yields under local conditions. It is apparently not realized that the production of hybrid

maize is no mere matter of seed multiplication but consists of a series of controlled breeding processes, and that the parental pure lines are the fruits of years of inbreeding and research.

The maize plant is so constituted that the ear is seldom fertilized by the plant's own pollen. The kernels formed are thus mostly hybrids and a maize variety is composed chiefly of a collection of hybrids which resemble one another in respect of certain characters such as period of growth, colour of seed and type of kernel.

If a maize plant is artificially self-fertilized by transferring the plant's pollen on to the silks of its own ear, inbreeding is brought about, and the hereditary characters normally obscure in the hybrid parents are partially revealed in the progeny. Some of these characters are so harmful that the inbreds in which they are incorporated, are either weak, sickly or misformed, and eventually die off or are otherwise eliminated by the breeder. Other inbreds receive predominantly desirable characters and are the source of the plant breeder's future selections.

In the course of inbreeding by self-fertilization the so-called lines which are evolved, become progressively more pure-bred for their hereditary characters and hence attain greater uniformity with which, however, is associated a reduction in size and a corresponding decline in productivity. Varieties with a productive capacity of, say, 20 bags per morgen will, after five or six generations of inbreeding, yield lines with a productive capacity of only 5 to 10 bags per morgen. If two of these inbred lines are cross-fertilized and the hybrid seeds are planted, strong vigorous plants of great uniformity may result with a probable yield of as much as 25 bags per morgen, i.e. more than that of the original variety from which the pure lines have been bred. *This high degree of uniformity and high yield is, however, obtained only in the first or hybrid generation. Growers must therefore obtain fresh seed every year. In the succeeding generations there is much less uniformity and the yields are greatly reduced.*

However, only a very small number, if any, of the lines obtained from selfing any variety will prove to be superior in the sense that their hybrids will be desirable as regards yield and other characters. Hence the isolation of a really good line is a matter of great moment, and with commercial hybrid seed companies the parentage of outstanding hybrids is a "trade secret". The efficiency of selection very largely determines the progress made with the isolation of superior breeding stocks.

Since hybrid vigour is manifested only in the first generation after crossing, it is necessary that the process of cross-breeding be repeated continually, as the yielding ability declines sharply in the second and other generations. Owing to the low yields of inbred lines which have to serve as parents, the production of hybrid seed for some time was not considered to be practicable and the breeding of maize continued to be based on the purification of genetic stocks by inbreeding and the recombination of desirable lines.

It was only after further progress in the sphere of theoretical genetics that the next step for the practical production of hybrid seed became possible. It was determined theoretically and demonstrated in practice that a high degree of hybrid vigour and uniformity could be obtained by crossing two first generation crosses instead of two inbred lines. As a result of this, the problem of low yields of hybrid seed as produced on inbred lines disappeared, for commercial hybrids are now produced on the high-yielding first crosses.

Present-Day Technique.

The present-day technique for the production of hybrid seed maize is therefore as follows.—(a) The process of inbreeding and selection for at least four to six generations so as to obtain superior breeding lines. (b) The making of single crosses between these inbred lines. (c) The making of double crosses between the single crosses.

These three phases require more detailed explanation.

(a) *The Process of Inbreeding*.—This requires the transfer of the pollen of each plant on to the silks of its own ear, all contamination with foreign pollen being avoided. In practice it is necessary that the ear should be covered before the silks emerge, and that the pollen should be collected and applied to the silks or beard at the right time and stage. Apart from the self-pollination process, the most important aspect of inbreeding is the selection of superior adapted lines. A prerequisite for this is a sound knowledge not only of the genetic characters of maize but also of those characters which are separately and collectively desirable.

(b) *The Production of Single Crosses*.—Inbred lines differ with regard to their capacity for producing superior hybrids, each line having a different and distinct "combining ability", i.e. ability to yield superior hybrids. This is a factor which has to be determined in advance. It is done by crossing each line with a standard variety and testing the hybrid seed obtained this way in a yield trial. The lines with best combining abilities produce the hybrids which give the highest yields in such a trial. But the lines which have thus demonstrated their superiority also possess specific combining ability, i.e. certain pairs of lines will yield hybrids superior to those of other pairs. This means that all the superior lines should be crossed with one another in all possible combinations and the hybrid seed planted in a comparative test to determine the specific combining aptitudes of the various lines. If all the results of such a test are available, then it is possible to calculate, with a fair degree of accuracy, the comparative yielding capacities of any four lines in a double cross.

(c) *The Production of Double Crosses*.—The tests necessary for determining which four lines have to go into a double cross will also provide data for determining in which combinations the four lines should be used, i.e. whether the single crosses of four lines A, B, C and D should be $A \times B$ and $C \times D$ or any other combination, as this is of importance in determining the productive capacity of the double cross. This, however, is merely a technical detail. Both the single and double crosses are obtained by planting the two parents (inbred lines and single crosses, respectively) together and detasselling the poorer pollen parent so that all the seed produced on that parent will be hybrid seed. The pollen or male parent usually occupies every third or fourth row only, so that two-thirds to three-quarters of the total area produces hybrid seed.

As already indicated, the production of single crosses for commercial seed is seldom feasible on account of the low productivity of inbreds. Pure lines may be utilized, however, in what is known as a topcross, i.e. a crossing of the pure line with a standard variety. Depending on the combining ability of the pure line used, such topcrosses may have great merit and the procedure has the advantage that an adapted variety can be used as one parent. But it rarely works well in practice and is usually rather wasteful of the expensive inbred seed.

The merits of the ultimate product will depend very largely upon strict adherence to technical requirements. For instance, one female plant which is not detasselled in time and is thus allowed to pollinate itself and its sister plants, will reduce the yielding potential of the hybrid. Inbreds have to be propagated and increased in very strict isolation so as to overcome any chance of contamination from outside. The double hybrids which are to be sold to growers must be tested in comparative trials to ascertain their relative merits both as regards yield and adaptability.

The above is a short outline of the procedure to be followed for the production of hybrid maize seed. It is obviously an undertaking which demands technical control and expert guidance.

Importation of Hybrid Seed Undesirable.

Representations have been made to the Department to allow the unrestricted importation of hybrids from the United States. Such a procedure is undesirable for very obvious reasons. Apart from the grave danger of importing maize diseases at present unknown in the country, it would be extreme folly to make the production of our most important grain crop dependant upon an overseas seed supply. Furthermore, as recently pointed out by Mr. Charles Enlow, the United States Agricultural Attaché, the hybrid maize industry has to be a home industry. Hybrids, as varieties, differ strongly in adaptability and those doing well in one area may have a mediocre to poor performance in another.

It is doubtful whether double hybrids could be had which surpass varieties like Sahara or Early King in adaptability. Since there appears to be room for many varieties, there will eventually be a demand for a number of hybrids. Furthermore, as the combining ability of lines becomes better known, better varieties will be bred, particularly the so-called synthetic varieties which would probably always do better in the more marginal areas.

Improve Yields by Better Cultural Practices.

It would obviously be a mistake to think that hybrid maize constitutes a panacea for all the ills of maize production. Although increased yields of ten to thirty per cent. may be obtained from hybrids, it is well known that yields could be doubled with a better standard of cultivation, better weed control, efficient manuring, judicious spacing and other known production measures. Hybrid seed can never reduce or remove the importance of these measures.

On the contrary, for best utilization and outstanding results hybrid seed demands a high standard of cultivation and manuring since the increased yields from it are naturally more exhaustive on the fertility of the soil.

The Department has a number of superior breeding lines at its disposal. In the past these have been used for the breeding of new varieties. Depending upon the results of appropriate tests, such lines could be used in crosses with equal facility, but it will be clear from the above that in the case of maize hybrids, the breeding phase could hardly be divorced from the production phase. The latter is obviously no legitimate function of the Department, and is, moreover, beyond the scope of the present Departmental organization. Although the Department could be expected to undertake only the

breeding phase for which it is equipped, an effort will be made, particularly at the beginning, to pilot the production of hybrid seed through all its phases.

If growers start their own organization for the production of hybrid seed, the Department would be only too keen to assist and is even prepared to supply small quantities of inbred material in such cases, but only if it is evident that such an enterprise has the necessary technical control and is therefore in a position to utilize such breeding material to the best advantage. It will not be possible to give breeding lines to individuals or to concerns which cannot comply satisfactorily with the necessary technical requirements.

In expectation of practical demands, the Department will increase inbreds and test experimental combinations as far as possible. It is hoped that double combinations will be available for extensive tests throughout the maize belt during the 1947-48 season.

The Horse on the Farm :—

[Continued from page 584.]

Temperament.—Good breeding and proper development and training will determine intelligence, courage and disposition—all of which go to make up character.

Form.—All parts of this living machine must function harmoniously and smoothly. Form must be completely adjusted to the function of the whole body.

The trained and experienced judge seldom uses the score card. His trained eye takes in the whole and first impressions are formed, after which quickly follows a more careful examination of details.

Examine the horse, while it is standing in a natural pose, from the front, sides and back—and again from all sides at different gaits. The feet and limbs are often handled to satisfy one as to their soundness or to reveal defects.

Pentachlorophenol Solutions in Wood Preservation.

P. M. D. Krogh, Wood Preservation Officer, Forest Products Institute, Pretoria, and F. G. C. Tooke, Forest Entomologist, Division of Entomology, Pretoria.

DURING the past decade notable progress has been achieved in the development of preservative treatments for the protection of wooden products against discolouring and decay fungi and against wood-attacking insects.

Records of the practice of wood preservation date from the eighteenth century when the salts of mercuric chloride and copper sulphate were used. At the present time creosote, which has gradually gained a leading place in most large treating concerns, is used to a far greater extent than any other wood preservative. For certain purposes, however, there are disadvantages attached to the use of both the present standard preservatives, namely, creosote and zinc chloride. Creosote is unsuitable for the treatment of furniture and other finished articles on account of its messiness, odour and the difficulty of painting over it, while with zinc chloride and nearly all other water-borne preservatives there is not only the possibility of leaching, but the wood also has to be redried after treatment. In both cases, too, dipping treatments which are the most popular and most easily applied, give practically no protection even with softwood timbers because of poor penetration; consequently, pressure or hot-cold open tank treatments must be resorted to.

In preserving timber against the ravages of the wood-boring beetles, *Hylotrupes bajulus* and *Lyctus brunneus*, it should be emphasized that these insects confine their activities to the sapwood only and that, therefore, it is only necessary to treat the sapwood. This is very fortunate, since it is impossible to impregnate the heartwood to any extent with chemicals, except under very special conditions, and even then only a thin, easily ruptured surface protection is achieved.

The advent of a preservative which is highly toxic to fungi and wood-destroying insects, and one which can be used in a solution, the main constituent of which has excellent penetrating properties and none of the disadvantages associated with either creosote or the metallic salt solutions, has therefore been a great advance in the field of wood preservation, particularly in regard to the prevention and control of insect attack. Such a preservative is pentachlorophenol, a crystalline organic chemical, moderately soluble in oil and other organic solvents, slightly soluble in white spirit and practically insoluble in water. Its volatility or vapour pressure is also very low, and of equal or greater importance is its high toxicity to practically all fungi, bacteria and wood-destroying insects. These characteristics gave promise that treatments with this chemical might give lasting protection to timber and wood products generally.

During the war years the urgent need of a wood insecticide, which could be applied to borer-infested wood *in situ*, stimulated the study of this toxic organic chemical dissolved in certain coal-tar

and petroleum distillates. The outcome of this study, the results of which have been published in the December 1945 issue of this journal, was that certain solutions of pentachlorophenol were evolved and their use as wood insecticides and preservatives strongly recommended. These recommendations, together with the fact that pre-treatment of a susceptible timber is now absolutely essential if the increasing damage by wood-destroying insects is to be prevented, have stimulated tremendously the use of pentachlorophenol solutions during the past twelve months. Several solutions other than those specifically recommended are now on the market and some of these are being used extensively. These solutions adhere fairly closely to the official recommendations, but as a natural outcome of trade competition, the possibility of cheaper but less effective solvents and diluents being used in future, cannot be ignored.

Principles to be Followed.

Since inquiries have already been made as to whether cheaper solvents and diluents may not be used, a discussion of the various solutions and their practical application would appear to be opportune.

In the use of pentachlorophenol solutions, emphasis must be placed on the need and the means adopted to obtain the absorption and penetration considered necessary for adequate treatment. The following general principles must be recognized in this connection:—

(a) Painting, spraying or dipping hardwood timber is largely ineffective, no matter what solvents or carriers of pentachlorophenol are used. Prolonged soaking will, however, give a measure of protection.

(b) The spraying and painting of softwood timbers may be resorted to where it is impossible to dip, and will be effective, provided the diluents or penetrants mentioned under (c) are used.

(c) For dipping treatments it is necessary to include in the pentachlorophenol solution a penetrant which will effect the desired penetration and absorption in the limited time allowed. The oils in which pentachlorophenol is usually dissolved are not of this class, and white spirit or a combination of white spirit and power paraffin should be used in such cases.

(d) Mild hot-cold open tank or pressure treatments are necessary for most hardwoods and other woods where full penetration of the sapwood is not otherwise obtained.

(e) As with any other preservative, timber should be dry and free from paint or any other protective coating before the preservative is applied.

(f) It is always more economical and generally advisable to treat finished sizes if possible, and preferably before the timber is put in place.

Recommended Treatment for Certain Pentachlorophenol Solutions.

(1) *Timber In Situ*.—Spraying or painting timber *in situ* is sometimes not entirely satisfactory, but is a method mainly suitable for the treating of *softwood* roofing, ceiling, general joinery and internal fittings which are *not painted* or otherwise covered. A 5 per cent. solution of pentachlorophenol in white spirit or 50/50

white spirit and power paraffin is a very suitable preservative for the abovementioned type of treatment. It does not discolour wood which can afterwards be painted or finished in any other manner required. Two thorough brushings or sprayings at a short interval are generally sufficient to give lasting protection. For small movable articles dipping may be resorted to. When wood is painted and not severely attacked, the injection of the solution into the flight holes in the case of *Lyctus* spp. by means of a hypodermic syringe is often quite effective.

When a slightly cheaper treatment is desired and a brown colour not objectionable, the pentachlorophenol may be used with equal quantities of white spirit and furnace oil for the second coat.

(2) *Pre-treatment*.—(a) A rapidly penetrating, clean, quick-drying and paintable treatment for the sapwood of all softwoods, and of one or two hardwoods such as *Limba*, is a cold dip of from two to ten minutes in a 5 per cent. solution of pentachlorophenol in white spirit alone or equal quantities of white spirit and power paraffin. Infested and still salvageable as well as uninfested timber may be so treated. For hardwoods a mild hot-cold open tank or pressure treatment is recommended, but where no facilities for such are available, a prolonged soaking treatment of several days, though very much less effective, would certainly be better than no treatment at all.

(b) For a cheaper treatment where cleanliness is of less importance, a 5 per cent. solution of pentachlorophenol in equal quantities of power paraffin and diesel type of oil is suggested for softwoods only, when prolonged soakings of from two to three hours or even longer are recommended. A mild hot-cold open tank or pressure treatment is necessary for hardwoods. Softwoods may also be treated in this manner. Wood which has been so treated is paintable within about a month.

When wood is treated according to the prescriptions under either (a) or (b) above, it must be ensured that the temperature of the treating solution does not exceed 120 degrees F.

In making up the pentachlorophenol solutions for the preservatives described above, it is necessary to use solvents such as sositroil (dehydrated castor oil) which at the same time act as plasticizers, or, if this is not possible, to add plasticizing materials (rosin, for example) separately, otherwise "blooming" will result. "Blooming" is the deposit of fine crystals of pentachlorophenol on the surface of the wood after drying, and the presence of these crystals is for many reasons highly objectionable.

(c) Provided oiliness and discolouration are not a disadvantage, the cheapest, yet an excellent, form of pentachlorophenol solution recommended for both softwoods and hardwoods for the hot-cold open tank or pressure process is a \pm 5 per cent. solution of pentachlorophenol in either diesel or furnace oil. While cleaner than creosote as ordinarily used, this treatment will give a somewhat oily dark-brown coloured product that is not expected to be painted. It would be most useful for heavy construction timber, sleepers, posts, poles and similar products in which paintability is not important. This treatment is essentially for all material exposed to the weather and in contact with the ground. It should be noted here that standard

specifications have been adopted for the creosote preservative treatment of poles, particularly telephone and electric transmission poles, and these would apply when use is made of pentachlorophenol in heavy oil solutions.

Absorptions and Penetrations.

The following *minimum* absorptions and penetrations are advised for the pre-treatment of timber, provided that not less than a 4 per cent. solution of pentachlorophenol is used. These requirements should be strictly adhered to if the desired results are to be obtained. Full particulars of the various methods used for hot-cold open tank and pressure treatments are available in other publications issued by the Forest Department.

(a) 1½ to 2 lb. per cubic foot and a minimum sapwood penetration of ¼ inch. This would be primarily for the prevention of attack by the powder-post beetle (*Lyctus* spp.) and the European house borer (*Hylotrupes bajulus*), but should give a certain amount of protection against termites and decay also. Interior timbers, millwork, furniture, etc., would largely be concerned.

(b) 3 to 4 lb. per cubic foot and a minimum sapwood penetration of ¾ inch for wood that is to be exposed to weather, termites and decay, but which is not in contact with the ground.

(c) 5 to 8 lb. per cubic foot, depending upon whether the wood is a hardwood or a softwood and on its sapwood content, which should be penetrated to at least 85 per cent. of its volume, for wood in contact with the ground and exposed to any wood-destroying agency excepting fire. Posts, poles and construction lumber would be involved.

Certain woods and necessary conditions of application, such as brushing and spraying wood *in situ*, may preclude the desired absorption and penetration being obtained at all times. With these exceptions, every effort should be made to ensure strict adherence to treatments of the above type and the use of the appropriate mixture.

It must be understood that the above recommendations are largely of a tentative nature for it is evident that the type of schedule needed to attain the desired treatment will vary considerably with the kind, size and condition of the wood. Short soaking periods will be sufficient for some woods, but it is equally apparent that hot-cold open tank or even pressure treatments will be necessary for others. The need of further local tests (which have already been initiated but which may be of long duration) before definite recommendations on some of these points can be made with absolute confidence, must be fully recognized.

Cost.

The cost of using the various pentachlorophenol solutions in preserving wood can be compared favourably with either that for metallic salts or creosote treatments, provided the correct solvents and carriers are used and that absorptions are regulated to suit the specific purpose for which the material is required.

Oil Carriers for Pentachlorophenol Solutions.

Data have been compiled by the Division of Entomology on such properties as specific gravity (60 degrees F.) and flash-point (closed cup method) in the case of certain proprietary oils, and the figures must be considered as approximately representative for oils of these general types. Different shipments of oils carrying the same designation may vary slightly, but not greatly, from the figures obtained, which, together with certain other details, will be applied to those interested on application to the above Division.

Similar variations may be expected in solvency for pentachlorophenol. The data on solvency are approximations for the samples tested, based on solution temperatures of 55-60 degrees F. Any use of the heavier oils examined would probably involve heated solutions, in most cases thereby lowering the viscosity and increasing the penetrability of such oils.

Acknowledgments.—The writers have much pleasure in acknowledging their indebtedness for certain suggestions to Dr. R. M. Lindgren, representative of A. D. Chapman & Co., New Orleans, who recently visited this country.

To Farmers and Landowners.

An appeal is made to owners of land to employ certain farmer ex-volunteers either on a salary or share basis.

A large number who desire employment have experience in all branches of farming throughout South Africa.

Ex-volunteers who go on farms on a share basis will be assisted financially by the Directorate of Demobilisation to acquire stock and implements.

Applications or offers of farms must be submitted to the Directorate of Demobilisation, Edward Street, Pretoria, marked "for attention Colonel Van Noorden," and state (a) name and address of farmer, (b) where the farm is situated, (c) type of farming, (d) whether a house is available for a married man, (e) conditions of tenure to the ex-volunteer.

The Handling of Milk and Cream on the Farm.*

(Division of Dairying.)

IN order to understand the principles underlying the care of milk and cream, it is necessary to know something about the nature of these substances.

Milk and cream are two of the most complex substances found in Nature, the chief constituents and the average percentage present in milk being more or less as follows:—Water, 87.75; fat, 3.40; casein, 3.10; albumen, 0.40; lactose, 4.60; and mineral water, 0.75.

Cream differs from milk in having the constituents in different proportions, the main differences being less water and more fat.

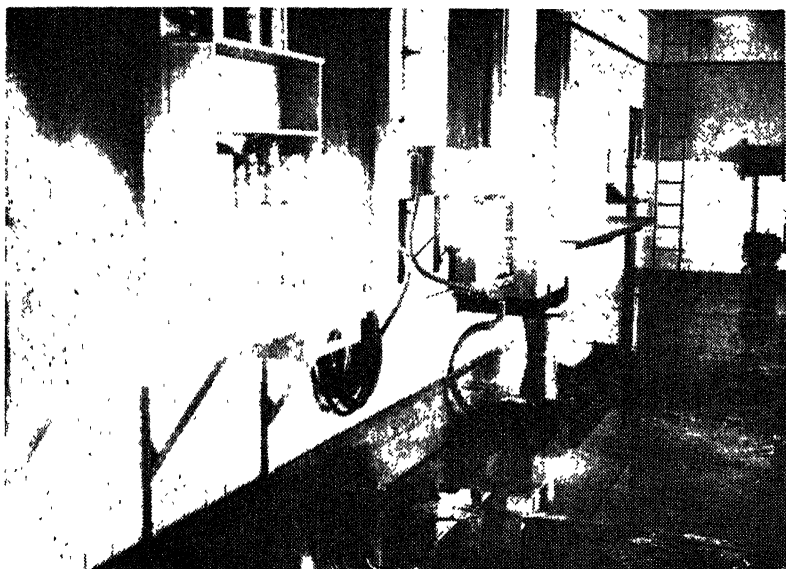


FIGURE 1.—Showing flat type of milk cooler connected to water supply by rubber hose from tap. The water discharges on the other side of the cooler and at the top. The milk supply tank, which feeds the cooler, is a disused separator supply tank. The brackets on which the cooler hangs are bolted through the wall.

Note method of fixing tables and sink so as to avoid legs on the floor, thus making it easy to keep the floor clean. The sink and slate table rest on reinforced concrete supports built into the wall. The wooden table on the left has wooden brackets bolted to the wall. The hose rests on a hose "saddle," which helps to prolong its life.

The water in milk is to all intents and purposes the same as ordinary water. Although its proportion seems large, it is exceeded in other foods such as, for example, beets, turnips and melons. The part played by water in milk is to dilute the solid elements to the proper strength for calf feeding, the purpose for which Nature intended cow's milk to be used.

* Originally compiled by Mr. L. A. Mosely, formerly Lecturer in Dairying, Grootfontein College of Agriculture.

Fat, commonly called butterfat or milk-fat, is the most important constituent from the farmer's point of view, because, if he makes butter on the farm, it is the fat that is required for the butter-making, or, if he sends cream to the creamery, it is the butterfat in the cream that he is paid for, and in cheese-making, the more fat the milk contains, the greater is the amount of cheese that can be made from a given quantity.

The fat in the milk is present in the form of very minute globules which vary in size with different breeds and also with the period of lactation. This accounts for some of the difficulties experienced in butter-making in getting the butter to form.

Butterfat is made up of several different fats, and some of these, whether in the milk or in the butter, are capable of absorbing odours and flavours. Hence the necessity for a pure atmosphere in the byre and milk-house, and also the necessity of not feeding the cows, just prior to milking, with any feeds likely to taint the milk.

The *casein* in milk has a very high food value, as it is a flesh-forming food. It is easily attacked by bacteria and changed into putrefying material.

The *albumen*, of which only a small portion is found in milk, is similar to that in an egg, and coagulates upon boiling.

The *lactose* (milk-sugar) is found only in milk of mammals. Like casein, it is easily attacked by bacteria, especially by the lactic acid bacteria which break down the sugar and form lactic acid. When sufficient acid has been formed by these organisms, the milk tastes sour, and the further production of acid causes it to become thick. This souring of milk is quite normal. The cheesemaker cannot make his cheese without the acid formation, and the buttermaker requires acid to "ripen" his cream so as to get the necessary flavour in his butter, but the milk-seller must keep this acid formation in check.

The *mineral matter* is made up of various salts, some of which are essential for the formation of bone and teeth.

Bacteria.

From this brief sketch it will be seen that milk can (1) be attacked by bacteria; and (2) take up odours and flavours.

Milk is considered an ideal food for human beings because it contains, in an easily digestible form, all the essential food elements for growth and development. For the same reason it is an ideal food for bacteria. *No other food product will undergo changes as rapidly as milk.*

As bacteria are mainly responsible for the troubles experienced in handling milk and cream, we will deal first with this aspect of the question.

Even under the most careful conditions, milk cannot be produced entirely free from organisms, but it is an established fact that the lower the initial contamination, the longer such milk will keep. The reason for this is simply that one germ will become two in a very short space of time—less than half an hour for some species. Therefore, if you start off with a large number, there is not much hope of the milk having good keeping qualities. There are, therefore, two questions to be considered:—

- (1) how to produce milk containing the minimum number of bacteria; and
- (2) how to control these bacteria so that they will not spoil the milk.

Milk being such a valuable and at the same time easily-spoilt food, most civilized countries have carried out experiments with a view to ascertaining what methods should be employed to produce clean milk with good keeping qualities. The methods given below are the results of such investigations, and in the larger municipalities of the Union it will be found that they are enforced by municipal regulations, if the farmer wishes to supply milk for direct consumption within the area of the municipality. The methods employed are neither costly nor difficult; they simply demand a little more attention to what is known as *cleanliness*. If the producer knows how milk becomes contaminated by bacteria, he is better able to guard against such contamination.

Avoiding Bacterial Contamination.

Health of the cow is the first essential. If the cow is unhealthy, there are liable to be large numbers of bacteria in her udder. These are withdrawn along with the milk. Normally, with a healthy cow, there are always a few germs that get into the teat canal. These, however, are easily got rid of by rejecting the first few squirts of milk from each teat.

With regard to unhealthy cows, few people seem to realize that the law definitely states that one may not sell milk, or the cream of such milk, from any cow that is known to be, or suspected of being, diseased. One may also not sell milk from a freshly-calved cow for *six clear days* after she has calved, and then one is required to boil such milk first to see that it does not coagulate. If, after six days, it does not coagulate, it is fit to use. The reasons for these laws are as follows:—As soon as a cow becomes ill, there is likely to be a change in the chemical composition of her milk, and a decided change in the bacterial content, and such milk may be harmful to use. Likewise, after a cow has calved, the colostral milk is different from the normal milk and, while some people may like it, it is liable to upset others, and is particularly harmful from a manufacturing point of view.

The *exterior of the cow's body* is the next point to look to, as this is where a good deal of contamination arises. The nature of the cow's coat and the conditions under which she lives, favour the accumulation of dust and, with it, bacteria. In the process of milking, the cow has to be touched, and unless some precaution is taken, pieces of dung, hair, and other dirt are bound to fall into the milk pail, carrying the bacteria with them. Straining will no doubt take out the dirt, but not the bacteria. In order to reduce to a minimum this source of contamination, the following points should be observed:—

- (1) Keep the hair on the flanks and udder short by clipping.
- (2) Just before milking, wipe the flanks and udder with a damp cloth, to remove loose hairs and dust.
- (3) Use what is known as the small top or partially covered milking-pail. These pails can be obtained from any dairy supply house. The top of the pail, being partly covered, reduces the area exposed by about 75 per cent. and so keeps out about 75 per cent. of the dirt that would have fallen in if such a pail were not used. There are many patterns of these pails on the market. Avoid those which are complicated and have a number of different parts.

The pail should be well made, seamless, and easy to clean. The *atmosphere of the stable and milk-house* often leaves much to be desired. Dust and dirt floating about are bound to find their

way into the milk. The practice of milking in open kraals cannot be too strongly condemned. If you cannot afford a stable for all your cows, at least put up a small one with a cement floor where a few cows can be milked at a time. Stables should not be swept out prior to milking, neither should dusty food be put in the mangers.

The *milker*, if he is not clean in his habits, may be responsible for many germs finding their way into the milk. Provide facilities for the mikers to wash their hands before milking. Their clothes should be clean. It is best to have aprons or overalls for milking-times only. Soap, towels and washing facilities must be provided and *used*. If the boys cannot milk with dry hands, petroleum jelly (a cheap form of vaseline) or one of the proprietary articles sold for the purpose should be used. This not only makes milking easier, but keeps the teats of the cow in excellent condition. Sick or unhealthy boys should not be allowed to milk, and remember: the better the milker, the more and richer milk will be obtained.

Utensils, if of a correct type and properly looked after, should not add much to the germ content of the milk. Milking-pails specially made for the purpose are often of faulty construction. All utensils used for milk and cream should be seamless or, if there are seams, they should be soldered flush so that there is no open space for milk to dry into. Milking utensils with milk still adhering to them should never be put into hot water. The milk (or cream) should first be washed off with lukewarm water and the utensils then scrubbed in hot water to which a little washing soda or other cleansing material has been added, being finally rinsed in boiling water. The boiling water not only destroys the germs, but also insures rapid drying of the utensils and so prevents the formation of rust. After removing the utensils from the water, place them in an inverted position on a suitable rack or table in an atmosphere where the air is pure and free from dust. Cover them with butter muslin to keep off flies and other insects.

Sterilizing with steam is far more effective than the use of boiling water. Special low-pressure boilers, to which a sterilizing cabinet is attached, can be obtained from dairy supply firms in this country. Such boilers give plenty of hot water for cleansing purposes, as well as steam for sterilizing, and are economical as regards fuel. Avoid the use of cloths for wiping utensils after washing; let them dry without wiping. The cloth will probably add germs to the utensil which has just been washed.

The *water supply*, if not pure, may be a source of contamination. Utensils washed in water from doubtful sources may lead to the spread of disease. Such troubles as "ropy milk" can nearly always be traced to the use of dirty, stagnant water.

Straining the milk may or may not be a source of contamination. If a dirty piece of cheese-cloth or butter muslin be used, then it will certainly add to the contamination. The best type of strainer to use is a metal one that fits into the top of the milk can and is provided with a fine wire gauze on which is placed a circular pad of cottonwool and then a coarser metal strainer, all of which are held in position by a metal clip. A fresh cotton pad is used for each milking. The straining of milk will not remove the germs, but gets rid of insoluble dirt and adds to the general appearance of the milk.

Attention to the above points and a little careful thought on the part of the milk-producer will ensure the production of milk with a minimum bacterial content.

Cooling the Milk.

The next thing to consider is how to control the bacteria that remain in the milk. This control is obtained by cooling the milk to as low a temperature as possible immediately after milking, but do not cool the milk if it has to be separated.

The most efficient and quickest way of cooling milk is with a milk cooler. It can be used on any farm where cold water is available. The cooler is worked on the principle that the milk passes over a large surface in a thin film on the outside, while water passes through the inside. The cooler is usually made of tinned copper, and is corrugated. Copper is used because it is a good conductor of heat, and the corrugations give a large surface without having an unduly large piece of apparatus. In setting up the cooler, care must be taken to ensure that the water enters the cooler at the bottom and that it works upwards to discharge at the top. The water runs up the cooler while the milk comes down and in this way the milk comes into contact with the coldest surface last.

The price of the cooler varies with its capacity and it is sold to cool so many gallons per hour. A cooler of ample capacity should be installed, as an inadequate cooling surface will result in trying to force too much milk over and so defeat its own ends.

For milk-cooling to be successful, it is essential that the milk be put over the cooler immediately it leaves the cow; and, once cooled, it should be kept cool until used or delivered to the consumer.

Milk comes from the cow at about 100 degrees Fahrenheit and if it can be cooled immediately to 60° and kept at this temperature, it will make at least 12 hours difference to its keeping qualities; the lower the temperature the longer it will keep. Milk produced under clean sanitary conditions and cooled to 60° F. should remain sweet for 24 hours, provided the temperature is not allowed to go above this figure.

Clean milk into householders' dirty jugs, left on the doorstep in the sun, or left about in open containers, will very soon sour.

Flavours and Odours in Milk.

While, as a rule, some attention is paid to prevent milk going sour, many farmers do not seem to realize that tainted milk causes almost as much loss to the dairy industry as sour milk.

The fact that milk, cream and butter readily absorb flavours and odours, good or bad, must always be borne in mind, because this accounts for a good deal of poor quality cream and, subsequently, butter. It must be remembered that very often it is the actual butter-fat in the milk that takes up the flavour or odour. Therefore, if the milk is slightly tainted, the cream from such milk is liable to have the taint more pronounced, and the butter will also be tainted.

These flavours and odours can in some cases be controlled, and may be classified as taints:—

- (a) due to weeds and feeds eaten by the cow;
- (b) due to dirty and unsuitable surroundings;
- (c) due to foreign substances.

Weeds and Feeds.—At particular seasons of the year, certain weeds or herbs will impart a distinct and very often objectionable flavour to the milk. The same applies to certain feeds. Such flavours and odours are caused mostly by the succulent feeds, and they vary in intensity.

Such weeds as wild onion and garlic will seriously taint the milk unless fed 6 to 8 hours before milking. Mustard, ragweed, tansy

and a host of others will also taint the milk but not to such an extent as the garlic. "Gifappel" may not taint the milk, but will cause it to thicken in much the same way as rennet does.

Silage made from maize or lucerne, if fed during milking or even an hour before, will often taint the milk. So will green rye, green lucerne, cabbage, kale, rape and turnips. On the other hand, green mealies, oats, barley, green peas, pumpkins and sugar beet do not appear to affect the flavour of the milk.

Nearly all flavouring materials in plants are volatile, and, if the plants are fed long enough before milking, such flavours will pass out from the cow's system without harming the milk. The rule to be followed to avoid taints due to weeds and feeds, is *not* to feed the cows *just before milking* with any substance likely to taint the milk. The more intense the flavour, the longer should be the time between feeding and milking.

In some cases the taints can be minimized by passing the milk over a cooler as soon as it is received from the stable. This will aerate the milk and allow the odour to pass off. In other cases, however, no known method will remove the taint, and it is therefore essential in such cases to prevent the cows feeding on such materials.

Flavours absorbed from surroundings.—Warm milk very quickly takes up any prevalent odours. If the cow stable is badly ventilated and stuffy, there will probably be a stale or covey odour in the milk; a manure heap too near the byre is also liable to give the milk a bad flavour. The room where the separating is done, often leaves much to be desired. It should be a roundavel or small room away from the stable, and should be reserved for dairy purposes only. It should have a cement floor, be well ventilated, have windows and door fitted with fly-screens, water laid on and a suitable sink and table for washing purposes. Racks for milk cans and utensils should also be provided. Harness, seed potatoes, mealies and such things, which one too frequently sees in the separator room, should not be allowed there under any circumstances. Do not allow more natives than necessary in the room while separating is taking place; some of them are decidedly smelly.

Flavours due to foreign substances.—This trouble is caused by using milk pails for household purposes, sending coffee to the lands in milk cans, using milk pails for gathering fruit, fetching water from the dam in milk cans, and many other purposes. Milk and cream cans should be used solely for milk and cream. While they are no doubt washed after being used for the purposes mentioned, the washing under ordinary farm conditions will not destroy the bacteria. The result is that the milk becomes contaminated with germs that are foreign to milk, causing bad flavours and other harmful conditions. Many a case of "ropy" milk can be traced to the use of dairy pails for fetching water from the dam. Such flavours as yeasty, fruity, sour, and cheesey may be brought about by using the dairy utensils for purposes for which they were never intended. A bitter flavour may be due to weeds, or, in winter, to the cream being held at too low a temperature. If a bitter flavour develops in the cream, the cream should be warmed up to about 70 degrees Fahrenheit and kept at this temperature until the bitterness has disappeared. Flavours due to bacterial origin increase in intensity as the milk or cream gets older; those due to weeds and feeds decrease.

(A subsequent article will deal with the separator and the handling of the cream.)

Classing of Poultry or Culling of Non-Producers.

P. J. Serfontein, Professional Officer (Poultry), Division of Agricultural Education and Research.

I.—Characteristics of Laying Hens.

IT may be mentioned at the outset that there is a great difference between the terms "selection" and "classing" or "culling" of poultry. These two terms have practically opposite meanings. "Selection" means building up or improving and it applies mainly to about 10 per cent. of the flock. "Classing" (or "culling"), on the other hand, bears little relation to breeding and refers chiefly to the non-producing and, therefore, unprofitable part of a flock of poultry.

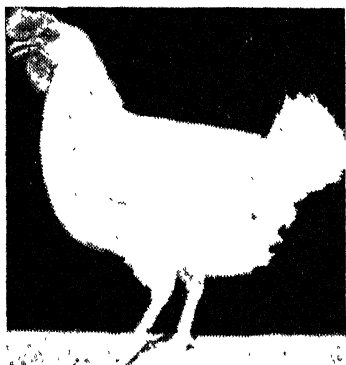


Fig. 1.—The egg-producing machine in March after having produced 273 two-ounce eggs. This type of hen will be profitable even when eggs are sold at a minimum price.

Although it has definitely been proved that no correlation exists



Fig. 2.—Weeds—a contributing factor in unprofitable poultry farming and a source of infection of all types of disease.

between the body conformation of a hen and the number of eggs she is capable of producing, the systematic classing of poultry must nevertheless be considered essential to the success of poultry farming. Although much is being written to-day on the increasing mortality of poultry, it is felt that if birds were to be classed more strictly, the danger of disease amongst them would of necessity decrease, since birds which are constitutionally weak, and which therefore ought not to be in the flock, are usually the first to contract diseases.

Culling of Undesirable Birds.

Few people succeed in mastering the difficult art of selection or mating. Culling of poultry, on the other hand, is such a simple practice that every poultry farmer in South Africa can, with very little trouble, apply it successfully.

Years ago culls were regarded as birds which lacked the breeding qualities of profitable producers. In other words, the blame was thrown on the hen. To-day general management and treatment are also taken into account. It has been definitely proved that wrong

management accounts for more culls than faulty breeding. Poor producers in whose case the costs of feeding exceed the returns, are eliminated by classing, as well as those hens which should by virtue of their breeding be good producers, but which are prevented by some bodily defect from producing enough eggs to be profitable.

The trap-nest and single pen have made it possible for us to make a study of the laying records of individual hens and to correlate such records with certain characteristics. The results obtained have proved that during certain times of the year it is possible to distinguish between good quality and poor quality hens according to certain characteristics, and with a high degree of accuracy between good and poor producers.

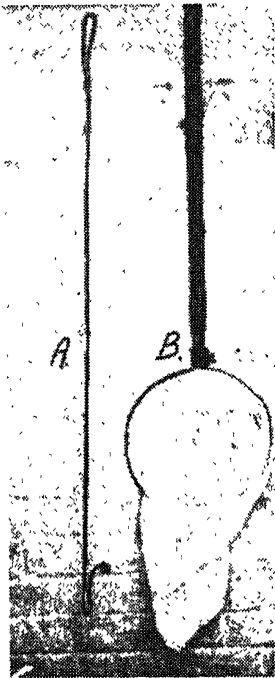


Fig. 3.—A. Catching hook.
B. Catching net.

When to Class.

It is sometimes asked what the best time for classing poultry is. In this respect a serious error is commonly made even by those who have their poultry classed annually. The general practice is to class poultry at the end of the laying season, i.e. from February to May, and this is the only period during which poor birds are eliminated from the flock. To be applied correctly, classing should begin with the placing of the eggs in the incubator and should be continued throughout the year. A weak or deformed chick must be destroyed as soon as it emerges from the incubator. Sickly birds and birds that lose condition or show signs of listlessness, should be removed immediately.

All birds should be in production between August and November, and hens not producing during these months should be removed. In the past much importance was attached to hens producing until late autumn. As a rule, a hen is called a good producer if she is still in production during April or May. Error easily arises in this respect, if hens are not removed as soon as they cease to lay.

Sometimes a break of as much as three months occurs, the hen ceasing to lay in August and recommencing production in December or January. If such a hen is handled at the end of April or in May, she will give the impression of being a late producer and may even be used in a breeding pen. Such a hen should definitely be considered a poor producer. The necessity of continually removing weak birds may be deduced from the foregoing. It should also be borne in mind that keeping such birds means expense only, as profits per unit are lowered and space is unnecessarily taken up at the food and water troughs and on the perches.

Classing or culling should therefore be practised throughout the year. Taken as a whole, our best incubation period is from July to the end of September. Pullets hatched during these months commence laying from January to March. These are also the months

during which there is a rise in the price of eggs and old birds go into a moult. If the young birds are well cared for and thus prevented from moulting for some reason, they should remain in production until the next autumn. If they start moulting during March and April, they will again be in production at the end of June or July, and should therefore not be culled on that account. From August onwards a few hens will cease to produce, and these should then be removed. If the flock as a whole could be handled twice, November and March would be the most suitable months, but if once only, February, March, or April can be recommended. Hens used for breeding purposes will also be selected at this handling. There is always a demand for table birds, and when non-producers are removed gradually, they can always be sold at a better price.



Fig. 4.—A piece of wire netting is secured a few yards from the corner, and the loose end is drawn round the birds.

A hen produces the maximum number of eggs during her first season, and on an average a hen's production decreases by twenty per cent. each year. Only the very best hens should be retained for the second season. The number of hens usually retained in the second year will depend on the general condition, the average production during the preceding year, and the health of the flock. The percentage retained for the following year will therefore vary with the different flocks, and may be as low as 15 per cent. and as high as 55 per cent. If the cost of production of a good hen is taken into account, it will be seen that it will be equally uneconomic to cull a hen capable of returning good profits during the second or third year.

Classing.

The most suitable person for classing a flock is the one who cared for the birds during the preceding year. Such a person is familiar with all possible external factors which may have affected the flock. It is also essential that the flock, as a whole, be normal at the time of handling. For example, a flock of pullets cannot be classed if 50 per cent. have gone into a moult during June or July. In such cases the cause of the moulting should be investigated.

Proper preparations should be made before each hen in the flock is handled. It has been noted that fowls are no longer handled on

farms, as the necessary facilities are lacking. During the handling of the flock the birds should be chased as little as possible, in order to prevent a decrease in egg production. Fortunately hens of one year or more are not so inclined to moult as pullets.

There are various ways of catching the hens. A length of wire having one end bent into a hook, a stick with a circular net attached to one end, a piece of wire netting by means of which the birds are driven into a corner, or a coop specially designed for catching, may be used. The first two will serve where a few birds are caught at a time. The coop is the most effective where the whole flock is handled, and no poultry farm should be without one.

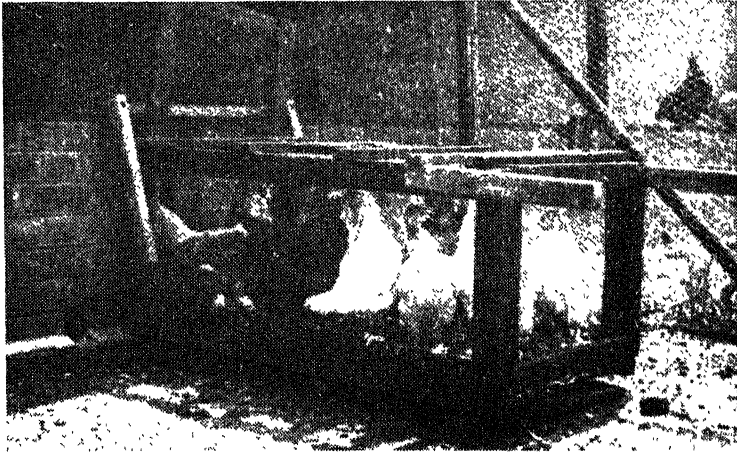


Fig. 5.—A combined coop for catching and transferring birds (6 ft. by 2 ft. by 2½ ft.), having two sliding doors in the sides and a small door on top for removing the birds.

The coop is constructed with a sliding door at the side and one at the top, and must be provided with a solid bottom. It is placed in front of an exit and 15 to 30 birds are allowed to enter at a time, the number depending on the size of the coop. The fowls can then easily be removed one by one through the top door. In removing the hens, great care should be taken that they are not injured. Place the hand on the bird's back and grasp the wing and leg. The head is then thrust forward, and few birds will struggle when held in this manner. The hen is placed on the palm of the hand with its head towards the classer, and the legs are grasped at the hocks with the fingers. One hand is thus left free to examine the hen. Sometimes a low box in which the foot can be placed is useful, as it may be necessary to rest the bird on one's knee.

Characteristics of a Good Producer.

It is a simple matter to determine from the comb, wattles, earlobes, pelvic bones and vent whether a hen is in production or not.

As soon as a hen comes into production, the flow of blood to the comb, wattles, and earlobes is increased. The comb becomes red, large, warm and soft. These characteristics are especially noticeable in a pullet in full production. At the end of the laying season the

comb and wattles will retain their condition if the hen is still in production, but the comb will be less waxy in appearance. As soon as the hen stops laying, the comb becomes shrivelled and dry, and will later be covered with a white, scaly material. The wattles and ear-

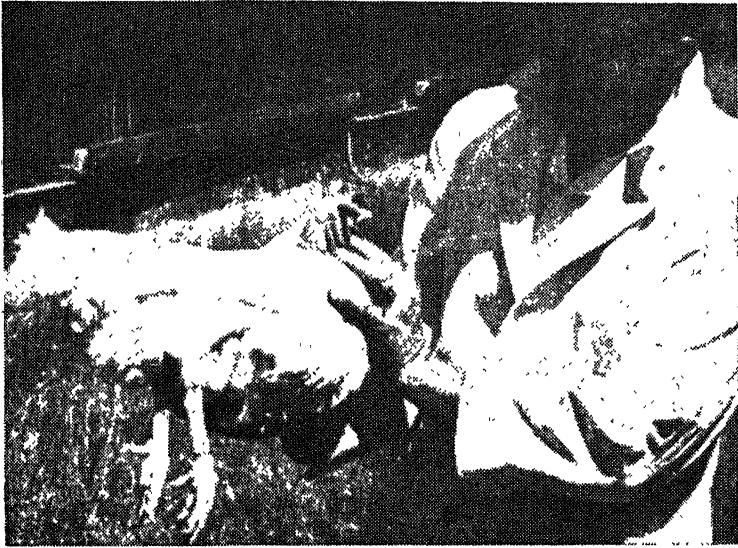


Fig. 6.—The hen rests on the palm of the hand, while the other hand is left free to examine the bird.

lobes react in the same way but to a less noticeable degree. The activity of the ovary is plainly visible in the secondary sex organs mainly as a result of the increased blood circulation. It has been proved that a hen in production has 20 per cent. more blood than one not laying, and it is therefore quite a simple matter to distinguish between producers and non-producers in the large-combed breeds. The same difference is noticeable in other breeds, but it is less conspicuous. The pelvic bones are usually two to three finger-widths apart in the case of producers, as compared with one to two finger-widths in non-producers. In the case of the producers the points are devoid of fat, whereas in the non-producers they are covered with a layer of hard fat. As soon as a hen ceases to produce, the distance between the points of the pelvic bone decreases.



Fig. 7.—A. Head of a poor producer—note the straight beak and narrow head.

B. Intelligent head of a high producer. Short strong beak and deep head.

When the hen begins to lay, the vent is enlarged and becomes moist and oval in shape. The lower part appears flat and is straight, while the upper part merges evenly with the surrounding muscles which are smooth, loose and soft. The vent of the non-producer, on

the other hand, is shrunken and dry, surrounded by hard muscles, and covered with a hard, dry skin.

Character as shown by the head in correlation with the rest of the body, is usually a good indication of a high or low producer. A good laying hen has a medium-sized head of good depth and breadth. Taken as a whole, the heads of poor producers may usually be divided into two classes. Firstly there is the narrow, shallow head described as the crow's head, and secondly the fleshy head. In the latter the eyes are sunken and small in appearance, the eyebrows sag, and the face may be full of wrinkles and feathers. These characteristics give



Fig. 8.—A. The comb becomes shrivelled as soon as a hen stops laying. B. Hen in production. The comb is large, pliable and waxy.

the hen a listless appearance. No other single feature reflects the vitality of the fowl to the same extent as the head, which is expressive of the rest of the body. Thus it will be found that a hen with a long, narrow head has a long, narrow body. Temperament and intelligence, which are rather difficult to describe, but which are so important in the selection of animals, are chiefly reflected in the head. The eye has been called the mirror of the body and bodily strength and health may be judged from the expression in the eye. Good producers have large and prominent eyes, the rings of which are oval in shape, and such producers will have a lively energetic appearance. The eyes of the poor producer are small, round and sunken, and are characterized by a dull, listless and sleepy expression. A good laying hen should have a fairly heavy beak, which should be well curved. A flat, long, straight beak is an indication of bodily weakness, while a medium heavy and well-curved beak is usually associated with a strong head, and usually indicates vitality.

Size of Comb and Colour of Eyes.

High producers have clean, open faces of a full red colour. When the hen stops laying, the face loses much of this smoothness and shows less colour. It should also be pointed out that although poor producers usually have small combs, it does not necessarily mean that



Fig. 9.—Hen with cataract in the eye after first year of production—a malady which has been increasing lately.

the other extreme is desirable. A very heavy or large comb is detrimental in hot as well as in cold weather. The comb is unprotected and extremely sensitive to the hot sun, while it becomes very cold during winter and is a source of great discomfort to the bird.

The colour of the eye varies in different birds, and, in classing, several variations will be noted in the shape and colouring of the eye. During the first season it is not so noticeable, but at the final classing at the end of the first year hens which show serious defects in this respect, should be culled. If this is not done, a large number of the hens turn blind during the second year. The hen

is quite sound in other respects, but she cannot find the food trough, and the best bred hen will be a poor producer if she lacks the necessary food. The results of experiments have proved that the mortality in light-eyed birds is much higher than among birds with normal eye-colouring.



Fig. 10.—Fluid or a growth in the abdominal cavity frequently occurs after one or two years' production; such hens should immediately be removed from the flock.

II.—Pigment and Moulting.

In the previous chapter comparisons were made chiefly with a view to determining whether a hen was in production or not. The next problem with which the classer is faced is the determination of production and period of production in the past. This may be done in one of two ways, viz. by determining the rapidity with which the yellow pigment is lost in the different parts of the body of yellow-skinned birds, and, secondly, by determining the time and manner of moulting. Unless the hens have received correct treatment, especially in respect of feeding, these two tests will be of little value. For this purpose use may also be made to some extent of body capacity and handling quality.

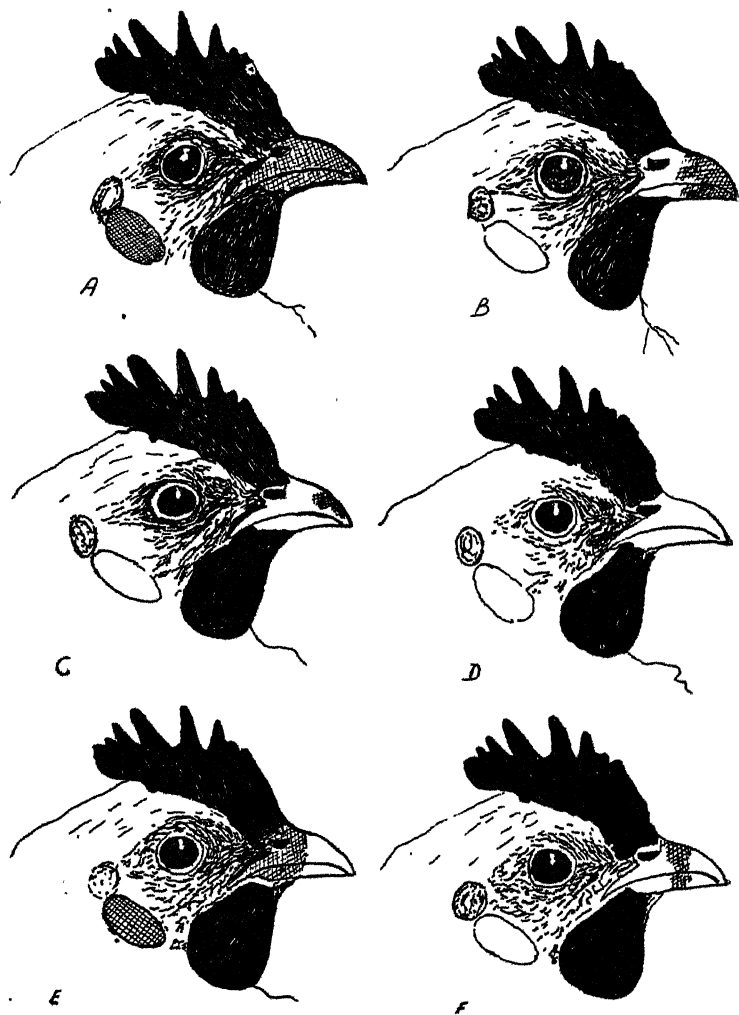


Fig. 11.

- A. Before the hen comes into production—eye-lid, earlobes and beak yellow.
- B. White earlobe and bleaching of the corner of the beak signifying a production of 10 to 15 eggs.
- C. and D. When loss of pigment has advanced to this stage, a hen has laid approximately 30 to 35 eggs.
- E. A hen which has been out of production for approximately 30 days—yellow eye-lid, lobe, and yellow in corner of beak.
- F. After production has ceased—yellow colour again disappears from corner of beak.

The Yellow Pigment in Relation to Production.

Loss of colour is of great value in determining the length of the period a hen has been in production. Unfortunately its use is limited to the breeds which have yellow in the legs and skin. Use can be made of this property especially during the winter months, spring, and until about the middle of summer. On the other hand, more effective use can be made of moulting during the latter half of the summer and autumn. These two methods are therefore conveniently linked up; taken

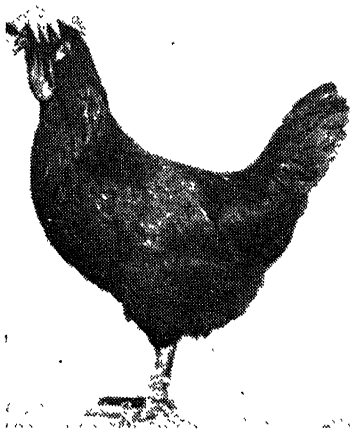


Fig. 12.—A Black Leghorn hen with good constitution, as may be observed from the compact, smooth well-oiled plumage, bearing, length and depth.



Fig. 13.—An early moulted with new plumage at the beginning of December. Note the clean appearance.

together they provide valuable information in estimating the production of certain hens, while at least one of them may be applied at any time in the course of the year.

By pigment is meant the yellow colour found in the skin of yellow-skinned fowls. This yellow colour is visible in the eye-lid, the beak, skin and legs of pullets not yet in production. The yellow pigment (xanthophyll) is the same as that found in yellow maize and in the yolk of the egg. The hen derives this material mainly from yellow maize and the green leaves of plants. When a hen is not in production, this pigment is stored in the body, and its intensity will therefore depend on the kind of food the hen is given, as well as on the general state of her health. An unhealthy bird or one with low vitality has a less rich colour than a healthy bird.

When, at the commencement of production, the yolks of the eggs begin to develop in the body of the normal pullet, the yellow pigment is no longer stored in the body, but is transferred to the ovary, where it is deposited in the form of small globules of fat to be used in the building up of the yolk of the egg. The pigment deposited in the layers of fat under the skin is partly lost by oxidation on the exterior of the skin, or is reabsorbed by the blood-stream likewise to be deposited in the ovary in order to assist in building up the yolk.

The presence of pigment should always be determined by daylight, since artificial light is unsuitable for this purpose. Changes

in colour occur most rapidly in those parts where the blood circulation is particularly fast or the skin particularly soft. Oxidation or bleaching occurs at the same time in all parts of the body, but the high rate at which the colour leaves certain parts gives them a bleached appearance, while other parts still retain their colour. The colour leaves the body in a definite order which is the same for all breeds. Certain breeds, however, lose colour more rapidly as a whole than others, the order being as follows in the more popular breeds: Leghorns, Wyandottes, Plymouth Rocks and Rhode Island Reds. The extent to which the pigmentation test may be relied upon, appears to be greater in the case of Leghorns than in that of the other heavy breeds.

When a yellow-skinned pullet begins to lay, the regions round the vent are the first to lose their colour, most probably as a result of the degree of expansion to which they are subjected and the softness of the muscles. Egg development commences about a fortnight before the first eggs are laid. By the time the first egg is laid, the pigment in the region around the vent has partially disappeared, and by the time the fifth to eighth egg is laid, this part will have a pale colour. After a few months of high production the vent becomes quite blue.

The eye-lids and the earlobes are the next to lose colour. The paling of the earlobes is of use only in those breeds which have white earlobes, such as Leghorns, Anconas, etc. The ear becomes pale after ten to fifteen eggs have been laid, and will be the third part to lose colour. The eye-lid, which is very thin and is well supplied with blood, comes second, loss of colour occurring at about the same time as around the vent. The classifier can best determine this by inserting the forefinger under the eye-lid so as to turn it back. Any sign of colouring will then readily be detected.

Loss of colour in the beak does not occur so readily as in the abovementioned parts. The yellow colour first disappears at the corners of the beak and then gradually towards the point. The last traces of colour will be visible in the middle portion of the upper beak. Half of the pigment will have disappeared from the beak when the hen has produced approximately 20 eggs, and by the time all colour has disappeared, the hen will have produced about 30 eggs. It therefore takes about six weeks of production to remove all the pigment from the beak.

Since loss of colour in the legs is a slow process, use may be made of this fact in order to estimate production over a long period. The period which must elapse before all colour has disappeared from the legs varies considerably and may extend over four to six months, depending on the intensity of production and the feeding of each hen. At the Central Egg-laying Competition there have been cases of large, sturdy hens that showed yellow colour in the legs after they had produced 198 eggs. The front part of the leg and the ball of the foot are the first to lose colour. The last traces of pigment are observed in the hocks and hard scales on the underpart of the foot.

If necessary, the amount of pigment which a flock originally had, may be judged by the intensity of pigment in the cocks. Pigmentation (colour bleaching) cannot be made use of in the selection of such breeds as Light Sussex, Australorps, etc. These breeds are judged chiefly according to the time and duration of moulting and the additional factors described below.

When a hen stops laying, the pigment returns to the various parts of the body in the same order as it left them, but it does so much more rapidly and very irregularly in different hens. It is inadvisable to use reappearance of pigment alone to determine the period for which a hen has been in production. As a rule, all high producers will be found to have very little or no pigment when they are handled in the autumn. A laying hen of high intensity of production which stopped laying a short while previously and in which the pigment has reappeared, may prove an exception in this respect. These hens may be selected correctly by making use of moulting in conjunction with handling quality.

As mentioned above, pigmentation can be utilized only when the birds have received normal treatment, and any additional factors which may affect it, are taken into consideration. The main factors that will have an effect are food, size, vitality and thickness of the skin. Birds which are given yellow maize and have access to green feed, will not lose colour as readily as those which are kept intensively. Large birds as well as those that have coarse thick skins, lose colour less rapidly. Sick birds or birds infested with internal or external parasites sometimes lose the pigment even before coming into production.

Effects of Moulting on Production.

The laying capacity of a hen can also be determined during the summer and autumn by the condition of the plumage. All hens lose their feathers annually and grow new plumage before winter. A hen stops laying as soon as she loses condition and starts moulting, as the growth of new plumage draws much energy from the body. In spite of this certain hens will be found to have a reserve of stamina, and although they start moulting, they continue to produce for a long period.

Generally speaking, moulting usually occurs between November and May. Instances of hens going into a moult before this and being excellent producers after the latter month, are exceptional. Poor producers take from 140 to 215 days to grow new plumage as compared with good producers, which take only 80 to 140 days. It very seldom happens that poor producers lay whilst moulting, but it does happen that good producers continue to lay for some weeks after having gone into a moult. A hen usually stops laying, irrespective of the number of eggs she has produced, as soon as she goes into a moult, and loses weight during the production period before she begins to moult, but if her body weight is maintained or increases, she will produce and moult at the same time.

The first moulters pass through the moulting period and recommence production at about the same time as the late producers. The poor producer will therefore be the first to stop laying and to go into a moult. Some birds will begin to moult in November or December, or even earlier. Late moulters, on the other hand, will probably not moult before April or May. Many late moulters complete the process so quickly that all feathers are lost within a fortnight, leaving the whole body denuded. Early moulters may again be brought into production under special treatment, but it is advisable to dispose of them.

Moulting in the flock as a whole may be retarded by special treatment with a view to maintaining body weight. It is nevertheless inadvisable to retard the process to such an extent that the birds are prevented from growing sufficient plumage before winter sets in.

Order of Moulting.

The process of moulting is characterized by a definite order, which is very regular. It begins in the head, followed by the neck, breast, huff and back; then come the wing feathers and, simultaneously or a little later, the tail feathers. The new tail feathers appear some weeks before the new wing feathers. The rapidity with which this order of moulting occurs, varies greatly, and it is not

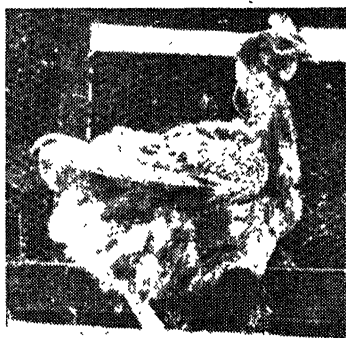


Fig. 14.—High producers usually lose all their feathers within a fixed period and rapidly grow new plumage.

unusual for a hen to lose practically all her feathers at the same time. Possibly the autumn cold causes the feathers to grow more rapidly in late moulters, in order that the body may be protected against the cold during winter.

Loss of the wing feathers also occurs regularly. The feathers of the wing are divided into two parts, viz. the secondary and primary wing feathers, separated by the axial or shorter feather. The primaries begin to fall out a few days before the secondaries and tail feathers. The primary wing feathers are on the outside of the axial feather. The primary feather next to the axial is the first to be shed and is followed

in regular order by the rest, the point feather being the last to fall out in a regular total moult. It is also quite usual for two or more wing feathers to fall out at the same time. The secondary wing feathers are not shed in the same regular order. In this case the feathers next to the body are shed first, i.e. the tenth to fourteenth feather, counting from the axial feather. The second feather from the axial is the next to fall out, and thereafter the feathers are shed in regular order in the direction of the body. After the last secondary feather has been shed, the axial and the first secondary feather fall out together.

Low producers and high producers take the same time to grow primaries, but there is a great difference in the rapidity with which they lose these feathers. Poor producers will be found to take about a fortnight to lose each primary feather, compared with only nine days in the case of high producers.

To determine a hen's moulting period, six weeks should be allowed for the first mature primary and two weeks for each additional mature feather. A wing with six mature new feathers, for example, indicates that the hen has been in a moult for 16 weeks. A new primary grows two-thirds of its total length during the first three weeks and one-third during the last three weeks. Use may be made of this fact in the absence of a full-grown primary from which to determine the moulting period. When mature, newly-acquired primaries are recognized by their clean, fresh appearance and the slightly broadened tip. Old feathers are more horny at the tips than new ones.

Moulting and growth of new feathers, as described above, occur very regularly in early and poor producers, but are less regular in high producers which are also late moulters. Good producers sometimes lose two, three, four or even five feathers at a time. When two

or more feathers appear at the same time, they are counted as one when the period is determined. This applies until the feathers are mature, when it is impossible to determine whether they appeared simultaneously or not. In this case use may be made of the length and hardness of the feathers on the body. High producers usually

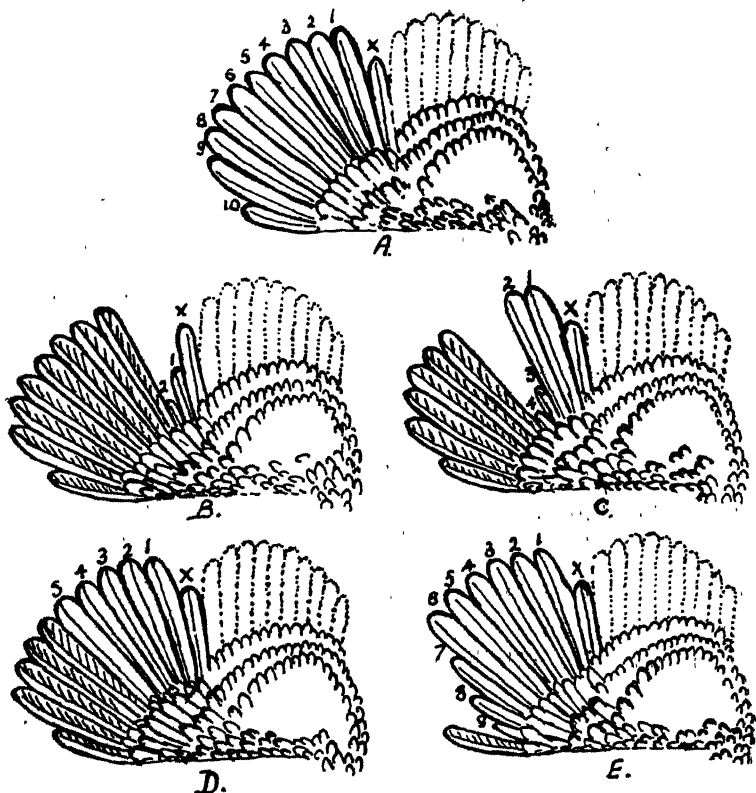


Fig. 15.—A. Normal wing before mouling. Primaries and axial feather marked X.
 B. Mouling commences; 1 and 2 are new feathers.
 C. A moult of 8 weeks is shown. Nos. 3 and 4 are not counted until they are half-grown.
 D. Represents a normal moult.
 E. Wing passing through a normal moult. The last feather has not yet dropped.

lose all their feathers at the same time, and grow new ones very rapidly. It takes 5 to 8 weeks before the body is completely covered with new feathers, after which the hen is ready to recommence laying. Hens which pass through a period of rest in summer and lose some of their primaries, lose the rest of their plumage before winter, after which the feathers grown during summer are also shed.

If a large percentage of birds in a flock go into a moult at any time other than the late summer or the autumn, it should be considered as unnatural. Pullets hatched during August or September should not go into a moult during the first summer or autumn. When

an unnatural moult occurs among old hens or pullets, it may usually be ascribed to incorrect treatment, the health of the fowls or, in the case of pullets, to change of housing, fright, etc. If hens do not receive correct treatment, there will be a fall in production usually followed by a partial or total moult. An unnatural moult of this nature may cause serious loss to the poultry farmer, especially if it occurs during autumn or in winter when eggs fetch high prices. As long as production remains above 50 per cent., there is no danger of such a moult, but as soon as production falls to below 40 per cent., it may occur at any moment.

If the hens receive careful treatment during these months, such unseasonable moulting may be prevented. Hens should not be disturbed or receive a shock. As soon as the hens lose condition, which is usually indicated by the number of eggs, steps should be taken, such as increasing the amount of grain feed, feeding a mash, adding milk to the feed, etc. Usually only the feathers of the neck are shed if unseasonable moulting is checked in time. If the moult is not checked, the hens may lose all their body feathers, which may result in their being out of production for a considerable time.

Hens may be forced into a moult by changing the ration, transferring them to new poultry houses or by starving them. This method does not appear to have much value, and can perhaps be recommended only in cases where breeders wish to get their breeding hens in condition with a view to the early hatching of chicks.

It is therefore clear from the foregoing that, when taken together, moulting and pigmentation may confidently be used to eliminate poor producers. Success in this respect will depend on the management and general condition of the flock.

[The final chapter on Constitution and Selection of Breeding Hens will appear in a following issue.]

Nursery Quarantines.

The following nursery quarantines were in force on 1 September, 1946:—

- (1) Howden's, Westville, Durban, on eugenias (all)—for circular purple scale.
 - (2) Krohn's Nursery, Pretoria, on ornamental trees (part) and opheopogons (all)—for red and spanish red scales.
-

Control of Cochineal in Spineless Cactus Plantations.

REVISED MEASURES.

Dr. F. W. Pettey, Principal Entomologist, Officer-in-Charge
Biological Control of Prickly Pear Species.

ALTHOUGH *Cactoblastis cactorum*, since it was first liberated in the veld in 1933, has accomplished considerable damage to prickly pear by destroying much of the succulent growth, by completely killing young plants, by reducing the fruiting capacity of this weed, and by greatly retarding its spread, it has nevertheless failed to attain the full purpose desired, mainly because it cannot thrive in the woody parts of its host plant. In considerable portions of the eastern Cape Province predacious ants have prevented this insect from making any progress at all. After four or more years of its establishment in the veld, it acquired considerable numbers of parasites and disease organisms. These factors, among others, continue now to hamper this insect to such an extent that it makes no increase and accomplishes little more than the maintenance of its existence in prickly pear, and causes only slight damage to spineless cactus. The Department of Agriculture therefore decided to introduce another insect enemy of the prickly pear to assist *Cactoblastis* in the destruction of this weed, and in 1937 the cochineal, *Dactylopius opuntiae* was imported from Australia.

This cochineal has now been distributed throughout the pear-infested areas of the eastern section of the Cape Province and in other parts of the Union where prickly pear has so increased as to become a menace. The insect has accomplished excellent destruction of the weed by greatly reducing the density of its growth, and has completely destroyed many large plants and woody branches in areas some distance inland from the coast.

Cochineal Damage to Spineless Cactus.

Unfortunately *D. opuntiae* also attacks, and causes damage to, spineless cactus species, except the round, dark green, thick-leaved varieties with deep red fruit such as *monterey* and *chico*, but they are not so palatable to stock as the varieties of spineless commonly grown, and they bear some spines. Aided by wind and other agencies, this cochineal has spread to almost all spineless cactus plantations in the country and has appeared in widely separated areas throughout the Union. If it is left undisturbed in a plantation, it will spread rapidly, will effect considerable injury to the plants, and particularly under drought conditions will destroy completely many plants, especially young ones, and those weakened by grazing stock. Neglected, scattered, isolated plants of prickly pear or small clusters of prickly pear in the spineless cactus plantation areas of the northern Cape Province, Orange Free State and the Transvaal, if they are not destroyed as soon as the cochineal appears on them, serve as bridges to facilitate and hasten the spread of the infestation to spineless cactus plantations.

The object of this article is, therefore, to acquaint owners of spineless cactus plantations with this insect in order that they may detect it and prevent its spread if it should appear there. It must be emphasized that if cactus growers fail to take concerted

action to avoid the establishment and increase of the insect, it will ultimately invade every spineless cactus plantation in South Africa. It is considered inadvisable to establish new plantations in an area where cochineal is already established in the vicinity until further information is available regarding the possibility of controlling this insect by chemical means.

Description of the Cochineal.

Dactylopius opuntiae is similar in appearance, habits and life cycle to other species of cochineal insects.

The cochineals are commonly called mealy bugs on account of their white, mealy or waxy covering which is secreted from glands in their bodies. Some species lay eggs and others give birth to young from eggs that hatch inside the body of the parent. *D. opuntiae* belongs to the latter group. For the first week or two following birth the two sexes resemble each other. When born they are no larger than a grain of fine table salt, elliptical in shape, dull pinkish red and only clearly visible through a magnifying glass. In the larval stage both sexes congregate for a day or two near the parent and then usually crawl to near the base of the spine clusters, or the rough circular spots or areoles where spines grow if a leaf pad is spineless, or to the cracks and crevices of the more woody segment of the plant, where they congregate in various numbers. The young male crawlers move about freely and, when several weeks old, spin small white narrowly oval cocoons. These are commonly found on and among clusters of female adults. In a few days in warm weather they emerge as tiny two-winged insects having two long white filaments at the hind end of the body. The male adults move freely and can fly, but do not feed, as the mouth parts are atrophied. Owing to their small size they are seldom seen unless searched for intently. The females, however, continue their development, remaining almost unchanged in form of the body. They have no wings throughout their life. The young female crawler, a day or two after birth, inserts her needle-like proboscis deep into the plant tissue, begins feeding, and remains stationary for the rest of her life without removing the proboscis from the place where it was inserted. The legs soon lose all power of movement. When mature, the females are widely oval and are covered with a brilliant white waxy secretion densely mixed with many fine filaments spun during the course of their development. The female crawlers have a tendency to move upwards from the terminal leaf pads on to the fruit, when fruit is present, and large numbers feeding cause it to drop before maturity. They not only suck the sap from their host plant, but they are also toxic to it, causing the leaf pads to drop and even killing the more woody segments. They are not poisonous to any animal and can be eaten without harmful effect. The insects are most commonly found on the surface of leaf pads most sheltered from wind, rain and hail. This may be due to the fact that the wind blows the larvae, or rain washes off the young insects, from the more exposed surface. When the infestation is heavy, the insects may cover the entire surface of spineless cactus segments or leaf pads, as well as much of the surface of the woody parts or trunks of the plants. They increase most rapidly in the summer months and in seasons of prolonged drought, and they receive serious setbacks as a result of heavy rains and hail which wash or knock off the young larvae. At Uitenhage there

is one generation every two months in summer, and one about every three months in winter.

Cochineal insects are spread mainly by the wind and by air currents which transport the very young larvae over long distances. They may be carried far and wide by means of larger animals ranging in size from beetles and birds to baboons and cattle. The young larvae may crawl on to the feet of birds and the bodies of larger insects as they rest on infested pear plants, or on to parts of stock and other animals as they come in contact with them, and so be carried to other pear plants or spineless cactus. By plantations throughout the Karoo, miles distant from the nearest prickly pear on which it was placed, aided by very scattered host plants, i.e., prickly pear or a few spineless cactus plants in gardens occurring at intervals of a few miles or less in that area, which have served as connecting "bridges". The enormous power of reproduction in the cochineal insects and mealy bugs is an important factor in their ability to spread.

Cochineal Easily Detected.

When cochineal reaches a cactus plantation, it will arrive there generally in very small numbers, unless the plantation is near an extensive area of prickly pear or of spineless cactus which is heavily infested. The insects usually appear first on only one or a very few leaf pads of a single spineless cactus plant, or only on a few plants widely separated in a plantation. They are very conspicuous and are easily detected. They appear in the form of small irregular clumps of white cotton-like masses, each of which consists of a number of insects. These masses increase in size and number, and the progeny of the females increase and spread rapidly to other plants if they are left undisturbed.

Prompt Eradication of Cochineal in a Plantation is Urged.

There is no effective spray material yet available for the control of cochineal and, even if it were available, it might be too costly to apply regularly to a large area of spineless cactus plants if the plantations were generally infested. The author is carrying out experiments with an emulsion of D.D.T. at Grootfontein College of Agriculture, and it is hoped that this spray material may prove effective. Even if it is effective, it will probably be practical to cope with the insect only in the early stages of an infestation in a plantation, when comparatively few plants have become infested, because of the expense involved.

It is therefore stressed that it is very desirable for the owner to have his plantation inspected by intelligent farm labourers monthly throughout each year, in order to deal with the few infestations as they appear.

If the insect's presence is detected while it has infested only a few leaf pads or parts of plants, the few clusters may be crushed by pressing them with one's finger, repeating this measure of control when new infestations are found. Inspection of all plants in a plantation should be made regularly and the infestations be disposed of by this method to keep the insect under control. This method is the cheapest and most satisfactory one for plantations where stock is not allowed to graze on the cactus plants. One labourer should be able to inspect regularly all the plants in a plantation of 40 morgen or less. If the plantation is larger, more labourers will be required. The inspection and the work of crushing the insect clusters should be thorough if control by this method

is to be successful. If the infestation has reached the stage where only a few very scattered plants are heavily infested, it may possibly be checked by burning these by means of straw or dried grass piled around and over such plants.

There is need of co-operation and concerted action among spineless growers of a district in measures to control the spread of cochineal. Neglect in the control of cochineal in one plantation will result in further spread of the insect to others in the vicinity. Neglected infested plantations or neglected scattered infested prickly pear will be a source of possible heavy infestations by the insect in other plantations of the district. Scattered prickly pear should be eradicated.

Control of Cochineal by means of Ladybird Beetles.

It is impractical to eradicate cochineal or keep it under control in a plantation by crushing the insect clusters if the infestation has been allowed to become extensive through neglect.

Plantations in which grazing of stock is allowed or practised, are unsuitable for adopting control measures by crushing the insect clusters because of the numerous stumps of partly eaten leaf pads which make detection and killing of the insects difficult. Grazing of stock in plantations should be avoided where possible to facilitate control of the cochineal by this method.

Cochineal has its natural enemies and in some cases it may be possible to make use of them in plantations where the infestation has become too general or intensive for adopting crushing, or where grazing by stock must be practised. These natural enemies comprise two species of small ladybird beetles, i.e., *Cryptolaemus* and *Eochochomus*. One is black with a reddish-brown head and hind end. The other is shiny black. Both are now widespread throughout the prickly pear areas and are easily seen among the cochineal insects on the plants. These beetles fly long distances and appear on the cochineal of the spineless cactus plants when the cochineal becomes well established and abundant in a plantation.

The owner of a plantation may spread these beetles in his plantation and thus hasten the control of the cochineal there. This he may do by having the beetles collected in nearby prickly pear areas and liberated in his plantation. They should be collected by one or more natives in a receptacle about the size of a shoe box, in which a little cochineal is placed to serve as food for them until they are liberated. Beetles are usually most numerous from about the 1st of September to November. Several thousand may be collected by one coloured labourer in one day if the beetles are abundant. As soon as possible after they have been collected, they should be liberated in the plantation—several hundred on each plant that is considerably infested with cochineal. It is useless to place beetles on plants or in a plantation where cochineal is not fairly abundant, as they will not remain there if the food is scarce.

To obtain the best results the beetles should be collected and liberated in heavily infested plantations from about August to October. As many beetles do not survive the heat and drought of summer and as the majority fly elsewhere when cochineal becomes scarce, it is necessary to replenish supplies in an affected plantation annually or whenever the cochineal becomes abundant again following a period of scarcity.

On account of the number of beetles required, this biological control method cannot usually be relied on to give commercial control of cochineal.

Planting of New Spineless Cactus Plantations Inadvisable.

Considering the present difficulties and expense involved in the control of cochineal, and considering also that the insect has already spread and has become well established widely throughout the Union, the writer is of the opinion that it would be inadvisable for farmers to establish new plantations of spineless cactus until the results of the Grootfontein spraying experiments are available and the costs have been worked out, so that it can be ascertained whether the control of cochineal on spineless cactus will be a practical proposition. The planting of a substitute drought-resistant succulent forage plant such as "American aloe" or agave and saltbush should be considered.

Nursery Quarantines.

The following nursery quarantines were in force on 1 August 1946:—

- (1) Howden's, Westville, Durban, on *Eugenias* (all), for circular purple scale.
 - (2) Clark's Nursery, Pretoria, on fruit trees, shrubs and palms (part), for pernicious, red, circular purple and rosette scales.
-

New Bulletins.

Bulletin No. 260 "The Nutrition of Poultry" by Prof. A. M. Gericke has recently been published.

It is obtainable from the Editor of Publications, Department of Agriculture, Pretoria. at 6d. per copy.

The Breeding Value of Friesland Bulls in South Africa.*

Dr. F. N. Bonsma, Department of Animal Husbandry,
Agricultural Research Institute.

(5) Ceres Lindbergh 12811/9 (20033 F.R.S.)



Ceres Lindbergh.

Date of Birth: 11 November 1930.

Died: 1938.

Breeder: Firma Schaap Deersum, Holland.

Owner: Messrs. J. H. le Roux & Sons, Bakenskraal, Oudtshoorn.

Score: 77 points in Holland.

78.4 points in South Africa (1934).

Ceres Lindberg was imported by Messrs. le Roux & Sons in February, 1934. Prior to being exported to South Africa he was used by Messrs. Schaap and sired the imported bull Willem 12863/9.

Pedigree.

Lindbergh, 17375 (Pref.).....	{	Lodewyk, 13921 Pref....	{	Lodewyk, 13337.
		Hieke XI, 63502.....	{	Bleske XXII, 42960.
Ceres XXIII, 46746.....	{	Roland II, 8539 (Pref.)..	{	Prins III, 14030.
				Hieke VIII, 56765.
		Ceres XXII, 30013.....	{	Gerard, 6808 (Pref.).
			{	Atje U, 25543.
			{	Pel XIX, 6240.
			{	Ceres XIV, 12801.

* This article is the third of a series, the first of which appeared in the April (1946) issue, and the second in June.

THE BREEDING VALUE OF FRIESLAND BULLS IN SOUTH AFRICA.

Production of Dam and Granddams.

	Age.	Milk.	B.F. Percentage.	Days.
Dam.....	2	7,601·0	4·03	329
	3	8,940·0	4·14	324
	4	10,784·0	4·91	329
	5	12,071·0	4·10	328
	6	12,181·0	3·93	329
	8	12,931·0	3·86	303
	9	11,948·0	3·62	307
	10	13,213·0	3·99	296
	11	20,402·0	3·71	321
Sire's dam.....	2	8,914·4	4·61	330
	3	10,062·8	4·37	317
	5	12,269·4	4·68	316
	6	8,212·6	4·71	321
	7	15,345·0	4·67	412
Dams' dam.....	2	6,589·0	3·51	323

From the pedigree of Ceres Lindbergh it will be seen that he was a son of the preferent bull Lindbergh, 17375 F.R.S. out of the cow Ceres XXIII (46746 F.R.S.) which was a granddaughter, on the sire's side, of Gerard 6808 F.R.S. On the dam's side Ceres XXIII goes back to the Albert 1306H and Zeppelin 5114 F.R.S. lines.

Ceres Lindbergh was extensively used in the Bakenskraal herd; he sired 108 male and 114 female calves, of which 69 male and 61 female progeny have been registered in the Friesland Herd Book. He was used mainly on the daughters of the imported bull Nico III 9581/7 and Melrose Zendeling 4082/5, which was one of the first South African bred bulls to be declared preferent.

Analysis of Data.

From the available milk records it was possible to make 54 dam-daughter comparisons. The milk records of both the dams and their daughters were, practically without exception, recorded in the Bakenskraal herd.

Bakenskraal is situated near Oudtshoorn in the Kamunat irrigation area, which is well known for its production of lucerne. Milk-production in the area is based mainly upon the utilization of lucerne and winter cereals for grazing. Extreme maximum summer temperatures, ranging between 95° and 105° F., are frequently experienced

Milk Yield and Butterfat Percentage.

Daughters (54).	Dams (35).	Average increase or decrease in production of daughters.	Percentage of daughters which show an improvement on their dams.	STATISTICAL SIGNIFICANCE.	
				P < .05.	P < .01.
7,224·7 lb.	10,318·0 lb.	MILK YIELD. —3,093·3 lb.	7%	Sig.	Sig.
3·67%	3·51%	BUTTERFAT PERCENTAGE. +0·16%	76%	Sig.	Sig.

during the months December, January and February. Unless shade is provided in the grazing paddocks, the high summer temperatures are liable to have a detrimental effect upon the milk-yield of high-producing dairy cows.

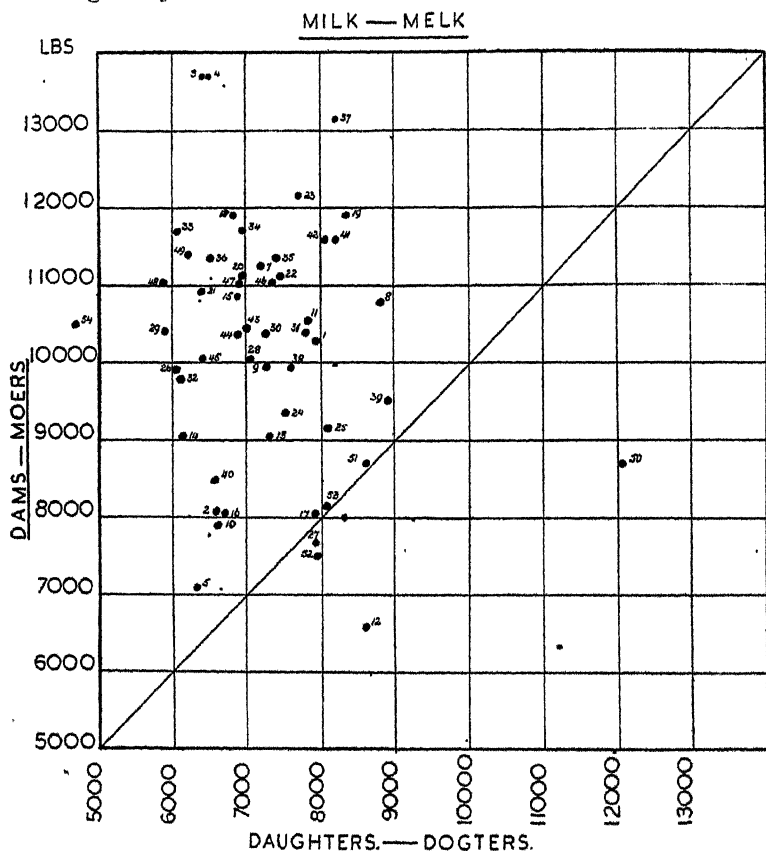


FIG. 1 (a).—Daughter-dam comparisons for milk yield on 2-year-old basis.

The analysis of the comparison between the average 2-year age-corrected milk yield and butterfat percentage of the available 54 daughters and their 35 dams is shown in the above table.

The distribution of the individual dam-daughter comparisons of the age-corrected milk yield and butterfat percentages are graphically shown in Figures 1 (a) and (b), respectively.

From the above table and the graphical presentation of the individual data it will be seen that there is a very significant ($P < .01$) decrease in the milk production of the Ceres Lindbergh daughters as compared with their dams.

A study of the individual records of the daughters reveals the interesting feature that the majority of them did not show the normal expected increase in yield corresponding with the increase in age as established by the age-correction factors.* Forty-seven daughters were actually recorded as two-year-olds. The average recorded two-year-old production was 8322.2 lb. as compared with 7173.8 lb. for

* See *Farming in South Africa*, April, 1946.

the calculated age-corrected two-year-old production based upon all the 300-day lactations available. The differences between the recorded 2-year-old productions and those calculated to a two-year-old basis were more pronounced in the case of the highest-producing daughters.

The records of the dams further reveal the interesting fact that the milk yields recorded after 1938 were appreciably lower than those of the earlier recorded yields of the same cows. It can thus be

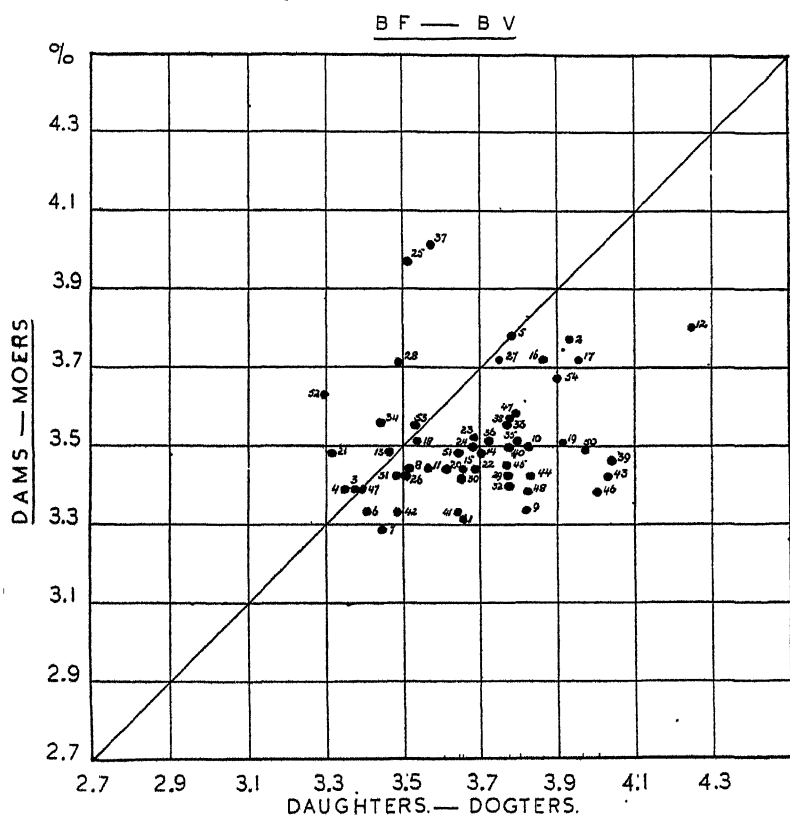


FIG. 1 (b).—Daughter-dam comparisons for butterfat percentage.

inferred that a marked change in the environmental and nutritional conditions had taken place from 1938 onwards. That this was the case was verified by the fact that prior to 1938 the cows were maintained and fed all the time on the irrigated pastures and were milked three times a day in the grazing paddocks. From 1938 onwards the cows had to walk considerable distances to be milked in the milking stable in order to comply with the municipal regulations for the sale of fresh milk, and were consequently milked only twice daily. In addition, the severe periodic droughts suffered in the Oudtshoorn area during the period 1939-1944 adversely affected the production of fodder.

The oldest Ceres Lindbergh daughters completed their first lactations in 1938 and, consequently, the average age-corrected productions cannot be considered as a true reflection of their optimum milk-producing potentialities. Since in all the early lactations the dams were milked three times a day and production took place under the

BULL: ... CERES LINDBERGH. 12811/9

OFFICIAL SCORE OF.....CERES LINDBERGH.....										
	Head.	Neck, Chest, etc.	Crops, Ribs, etc.	Hips, etc.	Thighs, etc.	Hocks, etc.	Udder, etc.	Skin, Hair, etc.	Character and Truth- ness to Type.	General Appear- ance.
OFFICIAL SCORES OF FEMALE PROGENY.										
A										
AB										
AB—										
B+		1	2		1			1	1	
B	9	7	16	4	51	5	2	57	11	3
B—	7	7	8	2	6	1	7	1	12	13
BC+	17	26	29	17	1	15	18		32	26
BC	26	18	4	36		38	32		3	17
BC—										
C+										
C										
CD										
TOTAL SCORES. 77.1, 80.1, 74.4, 75.4, 75.8, 77.9, 76.3, 74.2, 76.5, 74.4, 74.3, 79.3 75.5, 79.0, 74.1, 71.1, 77.2, 71.7, 75.4 74.1, 74.6, 74.4, 73.7, 72.2, 72.3, 71.9 75.6, 75.8, 72.8, 74.8, 74.5, 76.6, 74.3 72.7, 73.7, 73.7, 76.2, 73.5, 72.4, 73.7 74.6, 73.8, 77.5, 74.9, 75.8, 73.6, 73.7 74.0, 72.2, 73.4, 73.3, 75.9, 72.2, 72.2 72.2, 72.4, 72.8, 72.6, 72.6										

Average 74.5.

FIG. 2 (a).—Official scores of female progeny of Ceres Lindbergh.

THE BREEDING VALUE OF FRIESLAND BULLS IN SOUTH AFRICA.

b	b	b-	b-	b	b-	b	b+	b	78.4
Head and Horns.	Neck, Chest, etc.	Crope, Ribs, etc.	Hips, etc.	Thighs, etc.	Hocks, etc.	Milk Indication.	Character and True-ness to Type.	General Appearance.	
OFFICIAL SCORES OF MALE PROGENY.									
									A
									AB
									AB-
1				4					B+
3	6	2	1	54	2	60	3	2	B
9	6	5	1	7	1	7	10	6	B-
22	24	26	10	2	9		39	29	BC+
30	31	33	52		54		15	26	BC
2		1	3					4	BC-
									C+
					1				C
									CD
SCORES. 75.6, 71.7, 74.0, 73.7, 75.5, 72.6, 73.6, 72.2, 73.2, 73.9, 74.0, 73.2, 71.0, 71.3, 73.4, 72.5, 72.2, 72.1, 71.6, 70.8, 73.3, 72.8, 74.5, 76.4, 75.1, 72.0, 74.0, 72.0, 72.8, 73.0, 70.8, 76.9, 72.0, 71.2, 76.5, 78.4, 72.4, 72.8, 70.7, 73.1, 73.4, 72.5, 75.3, 73.9, 70.7, 73.1, 75.8, 75.7, 74.5, 73.1, 76.9, 74.7, 73.2, 75.8, 76.4, 74.5, 73.1, 78.2, 76.6, 72.2, 70.2, 75.0, 73.1, 70.9, 71.6, 72.0, 73.7.									

Average 73.5.

FIG. 2 (b).—Official scores of male progeny of Ceres Lindbergh.

more favourable nutritional conditions prevalent prior to 1938, the average dam-daughter comparison shown in the table above cannot be considered as a true reflection of the breeding value of Ceres Lindbergh.

In order to eliminate as far as possible the marked influence of the change which took place in the feeding and management at Bakenskraal, a comparison was made on an age-corrected basis between the milk yields of the Ceres Lindbergh daughters and the lactations of their dams, which were recorded since the beginning of 1938. It was possible to make 33 such dam-daughter comparisons.

The following table gives a summary of the results thus obtained.

Milk Yield and Butterfat Percentage Recorded since 1938.

Daughters (33).	Dams (24).	Average increase or decrease in production of daughters.	Percentage of daughters which show an improvement on their dams.	STATISTICAL SIGNIFICANCE.	
				P < .05.	P < .01.
7,081.5 lb.	8,342.4 lb.	MILK YIELD. —1,260.9 lb.	18%	Sig.	Sig.
3.70%	3.41%	BUTTERFAT PERCENTAGE. +0.29%	85%	Sig.	Sig.

From the above table it will be seen that the average decrease in milk yield of the daughters is only 1260.9 lb. as compared with 3093.3 lb. (shown in the previous table) calculated on all the available records of the dams, including those recorded prior to the change-over in 1938.

Further evidence of the limiting influence of nutritional and environmental factors upon the potential milk-producing capacity of the daughters of Ceres Lindbergh is shown in the differences between the actual recorded two-year-old production and the calculated age-corrected two-year production records based upon all the available records of each cow. The average recorded two-year-old production records of 34 available daughters was 8322.2 lb. as compared with the calculated average production of 7173.8 lb. for the same cows. The difference clearly indicates that the limiting nutritional and environmental factors prevented the normal expression of increase in milk yield with successive lactations.

Ceres Lindbergh was used mainly on the daughters of Nico III 9581/7 and Melrose Zendeling 4082/5. From the data available it was possible to make 25 dam-daughter comparisons with the Melrose Zendeling daughters, and 20 with Nico III daughters.

The following table gives a summary of the results based upon the calculated 2-year production records.

Ceres Lindbergh daughters (25).

7201.8 lb. milk; 3.67% B.F.

Melrose Zendeling daughters (15).

11093.3 lb. milk; 3.48% B.F.

Difference:— -3891.5 lb. milk and +0.19% B.F.

Ceres Lindbergh daughters (20).

7330.2 lb. milk; 3.72% B.F.

Nico III daughters (17).

8990.0 lb. milk; 3.54% B.F.

Difference:— -1659.8 lb. milk and +0.18% B.F.

From the above table it will be seen that there was a very marked reduction in the average milk yield of the Ceres Lindbergh daughters out of the Melrose Zendeling cows. The reduction in milk yield of the Ceres Lindbergh daughters out of Nico III cows was less pronounced and may be partially accounted for by the differences in environmental conditions.

Conclusions.

Taking into consideration the results of the analysis as a whole and the fact that the Ceres Lindbergh daughters were milked only twice daily under less favourable environmental circumstances than their dams, the following conclusions seem justified.

(1) The actual recorded two-year-old production of 8322.2 lb. milk and 3.70% butterfat can be considered as a satisfactory level under the prevailing conditions.

(2) The distribution of the individual dam-daughter comparisons, as shown in Figure 1 (a), indicates that Ceres Lindbergh was consistent in breeding for a milk yield between the levels of 6,000-9,000 lb.; this is a further indication of the limiting influence of environmental and nutritional conditions.

(3) The Ceres Lindbergh daughters were undoubtedly capable of higher production records under more favourable conditions. There seems no doubt, however, that Ceres Lindbergh was not capable of maintaining the high level of production of the cows to which he was mated, more particularly in the case of the Melrose Zendeling daughters.

(4) On the other hand, the Ceres Lindbergh daughters showed a significant ($P < .01$) increase in the percentage butterfat. The fact that 76% of his daughters showed an improvement in butterfat percentage proves that he was prepotent in this respect and bred very well for high butterfat percentage. The graphical distribution of the butterfat percentages of his daughters, as shown in Figure 1 (b), further substantiates the conclusion that Ceres Lindbergh bred consistently well for high butterfat.

Analysis of Conformation of the Progeny of Ceres Lindbergh.

The analysis of the score cards of 67 male and 59 female progeny of Ceres Lindbergh is shown in Figures 2 (a) and 2 (b).

From the data thus presented the following observations may be made and conclusions drawn:—

- (a) The average total score of all the male and female progeny was 73.5 and 74.5, respectively.
- (b) Ceres Lindbergh bred very few outstanding animals. Only one of his daughters scored 80 points, whilst the highest score recorded for a son of his was 78.2.
- (c) On the whole, his progeny were only fair in respect of their heads, width of hips, thurls and pinbones, and were inclined to be rather weak in the hocks.

(Generally speaking, however, his progeny were of a good dairy type.

Central Egg-Laying Competition at Glen.

Twentieth Open Competition and Twelfth Test of the Registered Breeders' Association.

J. A. de Beer, College of Agriculture, Glen, O.F.S.

THE above open competition and the Breeders' Register Test commenced on 3 April 1945 and terminated on 4 March 1946. A total of 615 hens was entered for the former—a decrease of 30 hens as compared with the previous test; and a total of 269 hens for the Breeders' Register Test—an increase of 49 hens as compared with the previous test. In the open competition pens of 5 hens each are entered, the performance of the best 4 birds only being taken into account. For the Registered Breeders' Association Test a pen consists of 10 hens, of which the best 8 birds are taken into account. These birds must be the progeny of registered parents and the owner must be a member of the Breeders' Register of the South African Poultry Breeders' Association.

Although these two contests differ and are consequently given separately, they have the following corresponding features, (1) the methods of treatment, feeding and housing are identical; (2) eggs are collected, weighed and recorded in the same way; and (3) the contests began on the same day and extended over a period of 48 weeks, divided into 12 periods of 28 days each.

At the close of each period the egg-production record and full details of positions, moulting, broodiness, sick hens treated, highest producers, and general climatic conditions are sent to each competitor. The colleges of agriculture compete with one another and not with private owners.

Rations.

The rations were the same as in previous years, viz.—

(a) *Mash*.—Yellow mealie meal, 33.5 lb.; lucerne meal, 10 lb.; beanmeal, 2.5 lb.; wheaten bran, 30 lb.; carcase meal, 6 lb.; bone-meal, 2.5 lb.; groundnut oilcake, 5 lb.; white fishmeal, 5 lb.; oyster-shell powder, 3 lb.; and fine salt, 1 lb.

(b) *Cereals*.—Crushed yellow mealies.

The egg recording and inspections were carried out in the same way as in previous years. Only grade "A" eggs were taken into account for position and certificates.

TABLE I.—Average Production per Hen.

(1) (a) *Open Competition*.

Breed.	Number of Hens.	PRODUCTION.			Total.
		A.	B.	C.	
White Leghorn.....	262	190.0	18.0	0.7	208.7
Black Australorp.....	119	188.5	13.6	0.2	202.3
Rhode Island Red.....	83	171.4	26.2	0.4	198.1
White Australorp.....	19	125.7	46.8	19.4	192.0
White Sussex.....	13	159.1	13.3	0.8	173.3
White Wyandotte.....	5	186.2	12.4	0.2	198.8
Barred Plymouth Rock.....	9	162.7	21.5	0.7	185.1
Buff Plymouth Rock.....	3	108.6	16.6	1.3	126.6
TOTAL.....	513	182.1	19.2	1.2	203.4

CENTRAL EGG-LAYING COMPETITION AT GLEN.

(b) *Breeders' Register.*

Breed.	Number of Hens.	PRODUCTION.			Total.
		A.	B.	C.	
White Leghorn.....	147	193·0	19·4	1·0	212·8
Black Australorp.....	64	188·1	17·8	0·6	206·6
Rhode Island Red.....	9	155·3	19·6	0·2	175·2
White Australorp.....	10	198·5	27·3	0·5	226·3
Light Sussex.....	10	112·6	36·3	0·5	149·4
TOTAL.....	240	187·1	20·0	0·8	207·6

(2) *Colleges of Agriculture—Open Competition.*

Breed.	Number of Hens.	PRODUCTION.			Total.
		A.	B.	C.	
White Leghorn.....	11	198·3	9·2	2·0	209·8
Black Australorp.....	15	193·8	8·5	0·4	205·8
Rhode Island Red.....	4	192·7	12·2	0·0	205·0
Light Sussex.....	5	101·2	4·6	0·0	105·8
TOTAL.....	35	183·2	8·6	0·8	192·7

(3) *Open Competition, including Colleges of Agriculture.*

Breed.	Number of Hens.	PRODUCTION.			Total
		A.	B.	C.	
White Leghorn.....	273	190·7	17·6	0·8	209·5
Black Australorp.....	134	189·4	13·0	0·2	202·7
Rhode Island Red.....	87	172·4	25·6	0·4	198·4
White Australorp.....	19	125·7	46·8	19·4	192·0
Light Sussex.....	18	143·0	10·9	0·6	154·6
White Wyandotte.....	5	186·2	12·4	0·2	198·8
Barred Plymouth Rock.....	9	162·7	21·5	0·7	185·1
Buff Plymouth Rock.....	3	108·6	16·6	1·3	126·6
TOTAL.....	548	182·5	18·5	1·2	202·7

If the figures for the open competition [see Tabel I (3)] are compared with those of the previous year, it will be seen that the average total production increased by 2·0 per cent.

The average total production of "A" eggs increased by 3.3 per cent. in comparison with the previous year, while the average total production of grade "B" eggs decreased by 1.8 per cent. and that of "C" eggs increased by 0.1 per cent.

If the figures for the Breeders' Register Test [see Table I (b)] are compared with those of the previous year, it will be seen that the total production decreased by 10.3 per cent. In this connection, it may be mentioned that the average total production of the previous year was particularly high, viz. 217.9. The average total production of "A", "B" and "C" eggs dropped by 5.0, 4.2 and 0.7 per cent. respectively.

Winners.

(1) In the *Open Competition* the production figures in respect of the best hens, i.e. those awarded the Blue Ribbon, were as follows:—

BEST HEN IN EACH DIVISION WITH A MINIMUM OF 250 "A" EGGS.

Breed.	Hen No.	Pen No.	PRODUCTION.			Total.	Owner.
			A.	B.	C.		
White Leghorn...	408	82	283	—	—	283	Dan Jacobs. Croaghanmora Poultry Farm.
Rhode Island Red	23	5	300	4	—	304	

(2) Breeders' Register.

Breed.	Hen No.	Pen No.	PRODUCTION.			Total.	Owner.
			A.	B.	C.		
White Leghorn...	845	170	299	2	—	301	C.A., Potchefstroom. J. J. Nel.
Black Australorp.	687	138	304	—	1	305	

TABLE II.—Three best Pens (Special Certificate).

(a) Open Competition (best 4 Hens).

Position.	Breed.	Pen.	Breed.	PRODUCTION.			Total.	Owner.
				A.	B.	C.		
1st....	Heavy	5	R.I.R.	1,046	15	1	1,062	Croaghanmora. S. C. Rix.
1st....	Light	101	W.L.	1,027	15	4	1,046	
2nd....	Heavy	31	W.W.	900	9	1	910	Mrs. A. M. Bartlett. Clayton Poultry Farm.
2nd....	Light	64	W.L.	1,000	19	—	1,019	
3rd....	Heavy	55	B.Aust.	876	51	1	927	A.S., Tweespruit. R. H. Fotheringham.
3rd....	Light	73	W.L.	986	7	2	995	

CENTRAL EGG-LAYING COMPETITION AT GLEN.

(b) *Breeders' Register (best 8 hens).*

Position.	Breed.	Pen.	Breed.	PRODUCTION.			Total.	Owner.
				A.	B.	C.		
1st....	Heavy	138	B. Aust.	1,954	13	5	1,972	J. J. Nel.
1st....	Light	170	W. L.	1,914	21	2	1,937	C.A., Potchefstroom.
2nd....	Heavy	130	B. Aust.	1,708	96	1	1,805	Mrs. G. F. Prinsloo.
2nd....	Light	150	W. L.	1,882	4	7	1,893	Dan Durach Poultry Farm.
3rd....	Heavy	122	W. Aust.	1,686	192	4	1,882	V. T. Crankshaw.
3rd....	Light	140	W. L.	1,878	55	3	1,936	The Aitken Farms.

The following Tables show the highest individual production and the highest production per pen of best 4 hens in 336 days from the first Central Egg-laying Competition.

TABLE III.

(a) *Highest Individual Production.*

Year.	OPEN COMPETITION.				BREEDERS' REGISTER.			
	Production.			Breed.	Production.			Breed.
	A.	B.	C.		A.	B.	C.	
1926-27	269	4	0	White Leghorn				
1927-28	284	0	0	" "				
1928-29	298	1	0	" "				
1929-30	314	0	0	Black Australorp				
1930-31	258	4	0	" "				
1931-32	285	1	0	White Leghorn				
1932-33	275	1	0	" "	The first Breeder's gan in 1934.			Register Test be-
1933-34	280	4	0	" "				
1934-35	284	1	0	" "	274	4	0	White Leghorn.
1935-36	270	9	0	" "	267	1	0	Black Australorp.
1936-37	270	15	0	" "	275	2	0	White Leghorn.
1937-38	267	0	0	" "	267	0	0	" "
1938-39	286	16	0	" "	267	2	0	Black Australorp.
1939-40	302	0	1	" "	276	12	0	White Leghorn.
1940-41	300	3	0	" "	254	13	4	" "
1941-42	273	12	3	" "	285	14	0	" "
1942-43	283	3	4	" "	269	16	1	" "
1943-44	273	0	1	Black Australorp	258	0	4	" "
1944-45	327	0	1	" "	302	1	0	Black Australorp.
1945-46	292	3	1	White Leghorn	304	0	1	" "

(b) *Highest Producing Pen (best 4 hens).*

(i) *Open Competition.*

From the first Central Egg-laying Competition (1926) until 1932, the production of the whole pen of 5 hens is given.

From the 1932-33 competition the production of only the best 4 hens in the pen is given and the highest producing pens were as follows:—

Year.	LIGHT BREEDS.				HEAVY BREEDS.			
	Production.			Breed.	Production.			Breed.
	A.	B.	C.		A.	B.	C.	
1932-33	974	34	0	White Leghorn	950	5	1	Black Australorp.
1933-34	1,012	6	0	" "	931	31	0	" "
1934-35	1,019	6	0	" "	982	50	0	" "
1935-36	971	24	3	" "	855	65	5	" "
1936-37	993	49	2	" "	997	65	2	" "
1937-38	921	27	1	" "	905	14	0	Light Sussex.
1938-39	992	66	22	" "	928	9	1	Rhode Island Red.
1939-40	1,063	3	3	" "	1,025	2	2	" "
1940-41	988	68	1	" "	913	21	1	Black Australorp.
1941-42	970	63	4	" "	945	58	1	" "
1942-43	964	7	1	" "	989	20	4	" "
1943-44	909	43	1	" "	970	47	5	" "
1944-45	1,011	7	1	" "	1,110	33	2	" "
1945-46	1,027	15	4	" "	1,046	15	1	Rhode Island Red

(ii) *Breeders' Register (best 8 hens).*

Year.	PRODUCTION.			Breed.
	A.	B.	C.	
1934-35	1,860	15	0	White Leghorn.
1935-36	1,820	138	2	" "
1936-37	1,993	75	0	" "
1937-38	1,850	183	4	" "
1938-39	1,948	40	5	" "
1939-40	1,912	105	12	" "
1940-41	1,783	126	6	" "
1941-42	1,750	90	9	" "
1942-43	1,750	119	1	" "
1943-44	1,838	32	6	" "
1944-45	1,932	10	7	" "
1945-46	1,954	13	5	Black Australorp.

TABLE IV.

The following hens laid more than 275 "A" eggs in 336 days and were consequently tested for 365 days. Their production during the 365 days was as follows:—

Hen No.	Pen No.	Breed.	PRODUCTION.			Owner.
			A.	B.	C.	
23	5	Rhode Island Red	325	4	0	Croaghanmora Poultry Farm.
136	28	Light Sussex	293	1	0	Columbia Poultry Farm.
155	31	White Wyandotte	297	0	1	A. M. Bartlett.
179	36	Black Australorp.	300	13	1	S. J. Clay.
409	82	White Leghorn	300	0	0	Dan Jacobs.
683	138	Black Australorp.	287	0	0	J. J. Nel.
684	138	Black Australorp.	285	4	0	J. J. Nel.
687	138	Black Australorp.	320	1	0	J. J. Nel.
688	138	Black Australorp.	301	1	0	J. J. Nel.
700	140	White Leghorn	305	3	0	The Aitken Farms.
845	170	White Leghorn	316	2	0	C.A., Potchefstroom.
889	173	White Leghorn	309	3	1	C.A., Co. Jara.

CENTRAL EGG-LAYING COMPETITION AT GLEN.

TABLE V.—*Highest Producing Hens.*

(a) *Open Competition.*

Breed.	Number in Competition.	From 240 "A" Eggs.		From 220 "A" Eggs.		From 200 "A" Eggs.	
		Number of Breed.	Percentage of Breed.	Number of Breed.	Percentage of Breed.	Number of Breed.	Percentage of Breed.
Rhode Island Red....	97	5	5.1	10	10.3	11	11.3
White Australorp....	20	—	—	2	10.0	1	5.0
Barred Plymouth Rock	10	—	—	—	—	1	10.0
Buff Plymouth Rock.	5	—	—	—	—	—	—
Light Sussex.....	15	3	20.0	—	—	1	6.6
White Wyandotte....	5	1	20.0	2	40.0	—	—
Black Australorp....	135	12	8.8	23	17.0	19	14.0
White Leghorn.....	288	47	16.3	42	14.5	46	15.9
TOTAL.....	575	68	11.8	79	13.7	78	13.7

(b) *Breeders' Register.*

Breed.	Number in Competition.	From 240 "A" Eggs.		From 220 "A" Eggs.		From 200 "A" Eggs.	
		Number of Breed.	Percentage of Breed.	Number of Breed.	Percentage of Breed.	Number of Breed.	Percentage of Breed.
Light Sussex.....	10	—	—	—	—	—	—
Rhode Island Red....	10	—	—	—	—	2	20.0
White Australorp....	10	3	30.0	1	10.0	1	10.0
Black Australorp....	73	12	16.4	8	10.9	17	23.2
White Leghorn.....	166	25	15.0	29	17.4	21	12.6
TOTAL.....	269	40	14.8	38	14.1	41	15.2

(c) *Colleges of Agriculture—Open Competition.*

Breed.	Number in Competition.	From 240 "A" Eggs.		From 220 "A" Eggs.		From 200 "A" Eggs.	
		Number of Breed.	Percentage of Breed.	Number of Breed.	Percentage of Breed.	Number of Breed.	Percentage of Breed.
Rhode Island Red....	5	—	—	—	—	1	20.0
Light Sussex.....	5	—	—	—	—	—	—
Black Australorp....	15	1	6.6	5	33.3	3	20.0
White Leghorn.....	15	2	13.3	2	13.3	2	13.3
TOTAL.....	40	3	7.5	7	17.5	6	15.0

Table V permits of a comparison between the average production per hen of the four main breeds entered for previous competitions.

TABLE VI.—Average Production per Hen.

Year.	WHITE LEGHORN.				BLACK AUSTRALORP.				RHODE ISLAND RED.				LIGHT SUSSEX.			
	Num- ber of hens.	Average per hen.			Num- ber of hens.	Average per hen.			Num- ber of hens.	Average per hen.			Num- ber of hens.	Average per hen.		
		A.	B.	C.		A.	B.	C.		A.	B.	C.		A.	B.	C.
Open competition.	595	204.6	7.5	0.3	212.5	195.4	9.7	0.3	205.5	177.9	4.3	0.1	182.4	148.2	8.2	0.5
1923-29.....	490	195.9	8.9	0.3	205.2	184.9	9.0	0.2	194.2	171.4	4.5	0.1	176.9	116.1	54.3	10.5
1930-30.....	572	179.6	15.8	0.7	196.2	177.4	12.9	0.6	190.9	149.4	4.3	0.1	157.1	116.1	54.3	10.5
1931-31.....	576	168.7	22.9	1.0	192.7	150.7	39.2	2.8	192.7	91.5	23.6	0.8	115.6	—	—	—
1932-32.....	292	191.0	24.6	1.4	217.0	164.1	27.3	2.8	193.9	136.1	53.9	6.5	201.5	—	—	—
1933-33.....	244	185.5	22.5	1.2	209.2	170.3	30.4	2.0	202.6	220.5	7.4	0.4	228.3	—	—	—
1934-35.....	252	190.0	23.6	1.5	222.1	185.2	37.2	1.8	224.0	195.1	15.5	0.3	211.0	—	—	—
Open Competition.	104	180.0	33.8	1.7	215.6	172.6	30.1	0.9	203.7	—	—	—	—	—	—	—
Breeders' Register..	104	180.0	33.8	1.7	215.6	172.6	30.1	0.9	203.7	—	—	—	—	—	—	—
1935-36.....	308	175.7	36.3	2.3	214.4	151.4	48.2	1.8	201.5	157.9	23.2	0.3	181.5	132.0	35.8	1.9
Open Competition.	96	165.2	38.4	2.1	205.8	149.1	53.3	2.6	205.0	128.2	59.7	1.0	189.0	—	—	—
Breeders' Register..	96	165.2	38.4	2.1	205.8	149.1	53.3	2.6	205.0	128.2	59.7	1.0	189.0	—	—	—
1936-37.....	202	191.5	23.3	0.8	215.7	191.4	17.5	0.3	209.3	182.1	25.1	2.2	207.4	148.7	33.4	1.7
Open Competition.	48	202.2	14.5	0.6	217.3	191.0	19.8	0.9	211.6	161.7	23.06	0.2	185.06	—	—	—
Breeders' Register..	48	202.2	14.5	0.6	217.3	191.0	19.8	0.9	211.6	161.7	23.06	0.2	185.06	—	—	—
1937-38.....	232	177.0	29.2	2.0	208.2	136.9	39.3	1.6	177.7	32	44.8	1.6	185.5	99.7	6.8	6.1
Open Competition.	48	188.8	20.9	0.6	210.4	190.16	32.2	0.43	222.9	160.5	50.57	0.62	212.0	—	—	—
Breeders' Register..	48	188.8	20.9	0.6	210.4	190.16	32.2	0.43	222.9	160.5	50.57	0.62	212.0	—	—	—
1938-39.....	280	193.0	22.0	2.0	217.0	181.4	21.7	2.3	205.4	196.3	7.5	0.8	214.6	114.3	43.7	7.9
Open Competition.	80	191.8	20.6	2.5	214.9	162.0	12.4	0.6	175.0	—	—	—	—	—	—	—
Breeders' Register..	80	191.8	20.6	2.5	214.9	162.0	12.4	0.6	175.0	—	—	—	—	—	—	—
1939-40.....	274	183.6	24.9	1.3	209.8	180.6	23.9	1.8	208.3	182.7	27.7	0.8	211.2	137.6	51.8	4.8
Open Competition.	170	199.5	25.6	2.9	223.0	196.8	18.2	1.1	210.1	—	—	—	—	—	—	—
Breeders' Register..	170	199.5	25.6	2.9	223.0	196.8	18.2	1.1	210.1	—	—	—	—	—	—	—
1940-41.....	309	175.5	36.9	2.7	215.1	171.5	30.7	1.0	203.2	163.3	34.5	1.8	199.6	113.9	42.5	2.2
Open Competition.	62	186.7	37.1	2.1	225.8	186.7	23.2	0.7	210.6	—	—	—	—	—	—	—
Breeders' Register..	62	186.7	37.1	2.1	225.8	186.7	23.2	0.7	210.6	—	—	—	—	—	—	—
1941-42.....	343	181.8	30.3	2.5	214.7	165.7	28.2	2.2	196.1	176.0	31.0	1.1	203.1	111.7	70.5	6.3
Open Competition.	77	199.8	20.2	2.3	222.2	143.2	8.1	2.1	153.4	—	—	—	—	127.2	69.7	3.0
Breeders' Register..	77	199.8	20.2	2.3	222.2	143.2	8.1	2.1	153.4	—	—	—	—	127.2	69.7	3.0
1942-43.....	343	181.8	30.3	2.5	214.7	165.7	28.2	2.2	196.1	176.0	31.0	1.1	203.1	111.7	70.5	6.3
Open Competition.	77	199.8	20.2	2.3	222.2	143.2	8.1	2.1	153.4	—	—	—	—	127.2	69.7	3.0
Breeders' Register..	77	199.8	20.2	2.3	222.2	143.2	8.1	2.1	153.4	—	—	—	—	127.2	69.7	3.0
1943-44.....	304	175.6	18.1	1.8	195.5	156.6	14.4	1.7	198.1	187.6	8.8	1.1	197.5	141.6	24.5	3.5
Open Competition.	122	185.5	19.6	2.0	201.2	156.6	8.4	1.0	166.1	—	—	—	—	103.6	7.2	2.1
Breeders' Register..	122	185.5	19.6	2.0	201.2	156.6	8.4	1.0	166.1	—	—	—	—	103.6	7.2	2.1
1944-45.....	282	185.1	21.2	1.2	207.6	188.0	11.2	0.8	200.1	167.1	21.6	0.7	189.5	137.0	8.0	2.0
Open Competition.	156	195.5	21.1	1.5	218.1	203.8	22.4	1.4	227.7	136.0	63.1	2.0	206.1	143.3	42.1	1.2
Breeders' Register..	156	195.5	21.1	1.5	218.1	203.8	22.4	1.4	227.7	136.0	63.1	2.0	206.1	143.3	42.1	1.2
1945-46.....	273	190.7	17.6	0.8	209.5	188.4	13.0	0.2	202.7	172.4	25.6	0.4	193.4	143.0	10.9	0.6
Open Competition.	147	193.0	19.4	1.0	212.8	188.1	17.8	0.6	206.6	165.3	19.6	0.2	175.2	112.6	36.3	0.5
Breeders' Register..	147	193.0	19.4	1.0	212.8	188.1	17.8	0.6	206.6	165.3	19.6	0.2	175.2	112.6	36.3	0.5

CENTRAL EGG-LAYING COMPETITION AT GLEN.

Post-mortem Examination.

All the hens which died in the course of the contest, were sent to Onderstepoort for examination. According to post-mortem reports received, the deaths were caused by lymphoid leucosis, internal haemorrhage due to fatty degeneration and rupture of the liver, inflammation, cancer, erithroleucosis, fowl paralysis, nephritis and salpingitis. Copies of these reports were forwarded to the owners concerned.

TABLE VII.—*Mortality during latest Competition.*

(1) (a) *Open Competition.*

Breed.	Number of Hens.	Number of Deaths.	Percentage Deaths.
Rhode Island Red.....	97	14	14.4
White Australorp.....	20	1	5.0
Barred Plymouth Rock.....	10	1	10.0
Buff Plymouth Rock.....	5	2	40.0
Light Sussex.....	15	2	13.3
White Wyandotte.....	5	—	—
Black Australorp.....	135	16	11.8
White Leghorn.....	288	26	9.0
TOTAL.....	575	62	10.7

(b) *Breeders' Register.*

Light Sussex.....	10	—	—
Rhode Island Red.....	10	1	10.0
White Australorp.....	10	—	—
Black Australorp.....	73	9	12.3
White Leghorn.....	166	19	11.4
TOTAL.....	269	29	10.7

(2) *Open Competition—Colleges of Agriculture.*

Rhode Island Red.....	5	1	20.0
Light Sussex.....	5	—	—
Black Australorp.....	15	—	—
White Leghorn.....	15	4	26.6
TOTAL.....	40	5	12.5

(3) *Open Competition, including Colleges of Agriculture.*

Breed.	Number of Hens.	Number of Deaths.	Percentage Deaths.
Rhode Island Red.....	102	15	14.7
White Australorp.....	20	1	5.0
Barred Plymouth Rock.....	10	1	10.0
Buff Plymouth Rock.....	5	2	40.0
Light Sussex.....	20	2	10.0
White Wyandotte.....	5	—	—
Black Australorp.....	150	16	10.6
White Leghorn.....	303	30	9.9
TOTAL.....	615	67	10.9

(4) *Whole Test.*

<i>Number of Hens.</i> 884	<i>Number of Deaths.</i> 96	<i>Percentage Deaths.</i> 10.8
-------------------------------	--------------------------------	-----------------------------------

The mortality given in Table VII (4), viz. 10.8 per cent., constitutes a decrease of 0.2 per cent. on that of the previous year. For the Breeders' Register [Table VII, 1. (b)] the mortality was 10.7 per cent.—an increase of 2.6 per cent. as compared with that of the previous year.

MORTALITY DURING LATEST AND PREVIOUS COMPETITIONS

(a) *Open Competition.*

Competition.	Year.	Number of Hens.	Number of Deaths.	Percentage Deaths.
First.....	1926-27	635	28	4.4
Second.....	1927-28	980	46	4.7
Third.....	1928-29	875	46	5.9
Fourth.....	1929-30	1,000	60	6.0
Fifth.....	1930-31	1,000	42	4.2
Sixth.....	1931-32	990	61	6.2
Seventh.....	1932-33	520	46	8.8
Eighth.....	1933-34	450	44	9.8
Ninth.....	1934-35	700	39	5.6
Tenth.....	1935-36	813	74	8.8
Eleventh.....	1936-37	685	48	7.0
Twelfth.....	1937-38	595	58	9.7
Thirteenth.....	1938-39	715	69	9.6
Fourteenth.....	1939-40	705	79	11.2
Fifteenth.....	1940-41	735	109	14.8
Sixteenth.....	1941-42	740	89	12.1
Seventeenth.....	1942-43	765	98	14.7
Eighteenth.....	1943-44	870	94	11.9
Nineteenth.....	1944-45	865	89	11.0
Twentieth.....	1945-46	615	67	10.9

(b) *Breeders' Register Test.*

Competition.	Year.	Number of Hens.	Number of Deaths.	Percentage Deaths.
First.....	1934-35	200	11	5.5
Second.....	1935-36	208	14	6.7
Third.....	1936-37	130	11	8.4
Fourth.....	1937-38	100	10	10.0
Fifth.....	1938-39	150	21	14.0
Sixth.....	1939-40	150	17	11.3
Seventh.....	1940-41	200	12	10.0
Eighth.....	1941-42	130	20	15.6
Ninth.....	1942-43	80	8	10.0
Tenth.....	1943-44	190	13	6.8
Eleventh.....	1944-45	220	18	8.1
Twelfth.....	1945-46	269	29	10.7

Conclusions.

From the results of the past competition, it is apparent that in future, breeders will have to pay more attention to:—

- (1) Strong constitution;
- (2) the breeding of hens from parents with high egg production as well as stamina;
- (3) elimination of families in which cancer occurs;
- (4) egg size as well as strength of shell; and (5) the production of birds which are free from B.W.D.

Crops and Markets

A Statistical and Economic Review of
South African Agriculture

by

The Division of Economics and Markets

Volume 27

SEPTEMBER 1946

No. 289

CONTENTS

	PAGE
Price Review for July 1946	637
Index of Prices Paid for certain Farming Requisites	638
Agricultural Conditions in the Union during July 1946	639
Index of Prices of Agricultural and Pastoral Products	640
The Egg-purchasing Scheme 1946-47 and Maximum Prices of Eggs	640
Price Tables and Indexes	641

Price Review for July 1946.*

Deciduous Fruit.—Apples were practically the only deciduous fruit offered on the market this month. The quality of apples on the Cape Town market was weak, while large consignments of apples were available on the Johannesburg market. Apples were scarce on both the Port Elizabeth and East London markets, and prices were consequently higher than those of the previous month.

On the Cape Town market Ohenimuri apples decreased from 17s. 9d. per bushel box in June to 14s. 5d. per bushel box in July; and White Winter Pearmain from 21s. 3d. per bushel box to 19s. 2d. per bushel box. On the Johannesburg market the same varieties showed the following decreases, namely, from 22s. 8d. to 21s. 3d., and from 23s. 2d. to 22s. 10d.

Tropical Fruit.—Quavas were generally well represented and the demand reasonable. Bananas were generally scarce throughout, except on the Cape Town market which was well supplied. The Johannesburg market was well supplied with papaws, but generally papaws and pineapples were scarce and dear. On the Cape Town market the prices of papaws increased from 3s. 8d. per standard box in June to 4s. 11d. per standard box in July; on the Port Elizabeth market from 5s. 2d. to 6s. 3d.; and on the Bloemfontein market from 4s. to 4s. 11d.

The following increases in the prices of pineapples occurred:—On the Cape Town market from 10s 7d. per box in June to 15s. 7d. per box in July; on the Port Elizabeth market from 7s. 5d. to 15s. 5d.; and on the Johannesburg market from 4s. 7d. per dozen to 9s. 3d. per dozen for ordinary pineapples.

* All prices mentioned are averages.

The markets were poorly supplied with avocados and grenadillas, and prices were higher than during June.

Citrus Fruit.—Naartjies were offered in moderate quantities but oranges were scarce and sold well at good prices. Lemon and grapefruit offerings on the Johannesburg market were moderate, but elsewhere these fruits were scarce.

Tomatoes.—The markets were well supplied with tomatoes, and prices were lower than those of the previous month. The markets were well supplied with lowveld tomatoes, while local supplies were scarce.

Potatoes.—On the Johannesburg market potatoes were generally plentiful, but the supply was largely of poor quality. The Cape Town market was reasonably supplied with potatoes, but they became scarce towards the end of the month and prices increased to the maximum level. On the East London market offerings were larger than those of the past month and prices decreased.

Onions.—Good supplies reached the markets and in general the price level of the previous month was maintained. The markets were especially well supplied with Cape onions.

Vegetables.—Cabbages were offered in large quantities and prices continued to decrease, namely, on the Durban market from 11s. 10d. per bag in June to 9s. 9d. per bag in July; and on the Cape Town market from 2s. 4d. per bag to 1s. 10d. per bag. On the Johannesburg market, however, the price increased from 5s. 10d. per bag in June to 7s. 11d. per bag in July. Elsewhere the markets were well supplied with vegetables, and prices changed according to the offerings. Pumpkin varieties were, however, scarce and enjoyed a good demand.

Fodder.—The Johannesburg market was well supplied with teff and sweet grass, but a large percentage of the supplies were inferior and sales were thus weak.

Lucerne and oats were scarce and realized maximum prices throughout. Moderate deliveries of green barley realized high prices.

Poultry and Poultry Products.—The supply of eggs to the markets increased, and prices decreased throughout. Poultry was poorly supplied and, with the demand keen, prices were maintained on a high level.

Index of Prices paid for certain Farming Requisites.

THIS index, as shown elsewhere in this issue, indicates that the prices of *agricultural implements, fencing material, dips and spraying materials* remained unchanged for the quarter ended 31 July in comparison with the previous quarter ended 30 April 1946. The index for *fertilizer prices*, on the otherhand, decreased from 204 to 199 as a result of a small decrease in the prices of superphosphate. As a result of the recent devaluation of the French money unit, rock phosphate could be purchased at a slightly lower price in Morocco. Prices of other fertilizing material, however, remained unchanged, and in some cases even increased slightly.

The index for *fuel* decreased from 146 to 130 as a result of a decrease of 4d. per gallon in the price of petrol during May 1946 (due to a decrease in the import duty of petrol), and a decrease of 1d. per gallon in the price of power paraffin during July 1946.

Bags.—The index for the prices of bags shows a very slight increase of one point, namely, to 305. The bag position is rather serious and it is expected that prices will rise considerably in the near future as a result of the Indian Government's termination of all trade with the Union. Only for the coming wheat season will there still be sufficient bags in the country, although all attempts are being made to obtain more supplies.

Feeds.—The index of prices for feeds increased from 163 to 168, mainly as a result of the higher prices of maize at the commencement of the present season, namely, as from the beginning of May 1946.

Building Material.—The index of prices for this also showed a slight increase of 1 point to 175 for the quarter ended 31 July 1946.

Agricultural Conditions in the Union during July 1946.

Rainfall.—Scattered showers occurred in the western, south-western, north-western and south-eastern Cape Province, some parts of the Karoo and in the Transkei. These precipitations were, however, slight. The rest of the Karoo, the Border area, and especially Natal, needed rain urgently. In general, rain was needed over the whole of the Union.

Grazing.—In parts of the Karoo, the south-eastern Cape Province, the Border area and in Natal the grazing deteriorated as a result of the drought. In the rest of the Union grazing conditions were still reasonable.

Livestock.—The condition of stock in the Cape Province was generally good, except in the south-eastern Cape where drought conditions prevailed. Lumpy skin disease still occurred in the western Cape Province, south-western Cape and in the Karoo. Gall-sickness occurred in the Transkei.

In Natal the stock is now in poor condition, while nagana is still causing losses. Lumpy skin disease also still prevailed in the north-western part of Natal. In the Transvaal and the Orange Free State the condition of the stock was still reasonable, although lumpy skin disease still occurred everywhere.

Crops.—On the whole, the winter crops in the Cape Province Orange Free State and the Transvaal were still promising, although rain was needed everywhere to help the young crops.

The maize crops were generally reasonable, whilst in the northern parts of the Transvaal, western Transvaal, western and eastern Free State the crops were above expectation. The maize crop of the north-eastern Orange Free State, however, was below expectation and the grain was also still exceptionally wet, whilst the crop in the border area of the Cape Province was below normal. In Natal, especially in Zululand, the crops were below normal as a result of the drought.

In the Transvaal lowveld the untimely frost towards the end of the month caused much damage to vegetables and fruit.

Index of Prices of Agricultural and Pastoral Products.

THIS index (see table elsewhere in this issue) decreased from 183 in June to 181 in July. The most important changes which occurred in the different groups were the following:—

(a) *Hay* (i.e. lucerne and telf) which increased from 178 in June to 182 in July, as a result of the increase in the market price of lucerne.

(b) *Other Agricultural Products* (i.e. potatoes, sweet potatoes, onions and dry beans) which increased from 285 in June to 306 in July, as a result of the increase in the market prices of potatoes and sweet potatoes.

(c) *Poultry and Poultry Products* (i.e. fowls, turkeys and eggs) which decreased from 295 in June to 218 in July, as a result of the drop in the price of eggs.

(d) *Dairy Products* (i.e. butterfat, cheesemilk and milk for condensing purposes) which increased from 218 in June to 231 in July, as a result of the higher premium paid on butterfat and cheesemilk.

The Egg-Purchasing Scheme 1946-47 and Maximum Prices of Eggs.

It has been decided that the Food Controller's egg-purchasing scheme will be continued this year by the Director of Food Supplies and Distribution. When the export trade in eggs practically ceased, this scheme was introduced in 1942 in order to ensure reasonable minimum prices to producers during the plentiful months, namely, July to October. The Scheme had then also the desired effect of keeping producers' prices on a higher level during the plentiful season than would otherwise have been the case, as the Food Controller undertook to purchase all surplus eggs and to hold them in cold storages for distribution during the scarce season.

In order to exercise better control over the quality of eggs for cold storage purposes, the Food Controller again retains the power to purchase only certain grades of eggs. During the present season the Food Controller will therefore again purchase only Grade I large and medium eggs for storage at 1s. 8d. and 1s. 6d. per dozen, respectively. These buyers' prices are 1d. per dozen higher in each case than the commencing prices of the past season.

The corresponding maximum wholesale and retail prices of eggs in the controlled area have again been amended and are as follows:—

	<i>Maximum Prices per Dozen.</i>	
	<i>Wholesale.</i>	<i>Retail.</i>
<i>Grade I.</i>		
Extra large	1s. 10d.	2s. 1d.
Large	1s. 8d.	1s. 11d.
Medium	1s. 6d.	1s. 9d.
Small	1s. 4d.	1s. 7d.
<i>Grade II.</i>		
Large	1s. 6d.	1s. 9d.
Medium	1s. 4d.	1s. 7d.
Small	1s. 2d.	1s. 5d.
<i>Grade III.</i>		
Mixed	1s. 3d.	1s. 3d.
For particulars, see <i>Government Gazette Extraordinary</i> of 9 August 1946.		

Average Prices of Eggs and Poultry on Municipal Markets.

SEASON (1 July to 30 June).	EGGS.			FOWLS (Live, each).			TURKEY COCKS (Live, each).		
	Johannes- burg, New- laid. Per Dozen.	Durban, New- laid. Per Dozen.	Cape Town. Per 100.	Johannes- burg.	Durban.	Cape Town.	Johannes- burg.	Durban.	Cape Town.
1938-39.....	s. d. 1 0	s. d. 1 1	s. d. 7 11	s. d. 2 6	s. d. 2 4	s. d. 2 7	s. d. 10 7	s. d. 12 7	s. d. 10 3
1939-40.....	0 11	1 3	7 4	2 6	2 5	2 5	10 2	12 5	9 8
1940-41.....	1 1	1 3	8 3	2 11	2 10	3 0	8 5	12 0	9 8
1941-42.....	1 6	1 9	10 7	3 5	3 4	3 7	12 10	16 2	14 4
1942-43.....	1 10	2 0	13 5	4 6	4 2	4 8	16 3	18 10	15 0
1943-44.....	2 1	2 2	14 2	5 3	5 3	5 6	16 7	20 6	15 8
1944-45.....	1 11	—	14 10	5 1	5 6	5 9	16 8	18 5	18 7
1945—									
January.....	2 3	2 2	17 10	4 5	5 2	5 6	12 8*	17 8	17 0
February.....	2 6	2 6	19 10	4 7	5 5	5 6	12 0	21 2	15 11
March.....	2 9	2 10	20 5	4 8	5 6	5 7	12 9	12 4	15 6
April.....	3 2	3 2	22 7	5 1	5 10	5 5	13 0	13 1	15 1
May.....	3 3	3 8†	24 0	5 4	4 11	5 4	13 10	14 9	15 1
June.....	3 2	3 5	25 11	5 11	6 1	5 11	13 0	16 7	21 1
July.....	1 10†	2 0	16 5	6 4	6 6	6 2	17 5	15 10	19 5
August.....	1 7	1 6	11 11	6 1	6 8	6 0	18 4	18 9	22 2
September.....	1 5	1 5	11 0	5 6	6 3	6 1	17 10	19 7	24 8
October.....	1 6	1 7	10 11	4 8	5 11	5 8	17 3	20 5	13 8
November.....	1 7	1 8	11 7	4 4	5 5	5 7	15 6	20 1	23 6
December.....	2 0	2 2	14 1	4 5	5 4	5 5	14 0	17 7	—
1946—									
January.....	2 4	2 7	18 3	4 6	5 5	5 6	14 1	14 8	—
February.....	2 3	2 10	20 11	4 3	5 5	5 4	12 0	15 10	—
March.....	3 0	3 2	21 6	4 7	5 9	5 8	12 4	14 3	—
April.....	3 6	3 9	27 2	5 1	5 7	5 6	12 5	12 9	—
May.....	3 6	3 10	28 6	5 8	5 9	5 3	13 9	18 0	—
June.....	2 11	3 2	26 9	6 2	5 11	5 8	15 9	15 6	—
July.....	1 11	2 1	16 2	6 5	6 1	6 1	17 1	17 8	—

* Prices of Turkeys: Live, each.

† Large, Grade I.

Prices of Bananas and Pineapples on Municipal Markets.

SEASON.	BANANAS (Per Crate) (a)			PINEAPPLES. (b)						
	Cape Town.	Johan- nesburg.	Pretoria.	Cape Town. Box.	Durban. Doz.	Johannesburg. Ordinary. Doz.	Queens and Giants. Doz.	Port Elizabeth. Box.	East London. Doz.	Blom- fontein. Bushel Box.
1938-39.....	s. d. 22 5	s. d. 9 10	s. d. 16 5	s. d. 5 4	s. d. 3 3	s. d. 1 1	s. d. —	s. d. 3 5	s. d. 1 2	s. d. 4 10
1939-40.....	24 4	8 7	15 10	6 1	3 10	1 4	4 8	3 10	1 5	4 9
1940-41.....	27 0	7 2	14 3	5 10	2 8	1 5	2 1	4 5	1 5	5 10
1941-42.....	28 6	7 6	14 6	6 6	3 0	1 7	2 5	4 6	1 8	6 2
1942-43.....	30 0	11 9	22 7	7 4	3 0	1 3	3 10	4 11	2 1	7 3
1943-44.....	37 8	13 2	13 10	8 3	3 6	2 4	2 1	6 3	2 10	8 4
1944-45.....	—	—	—	10 4	3 9	2 6	3 9	7 3	3 3	8 6
1945—										
January.....	31 9	12 11	14 0	7 7	—	1 4	2 2	6 3	2 4	6 3
February.....	32 8	13 5	16 7	5 11	—	1 5	1 3	5 4	2 7	6 11
March.....	27 1	13 7	14 8	6 3	—	1 7	2 5	4 11	4 7	5 6
April.....	34 11	14 10	17 4	7 4	—	2 2	3 5	5 9	2 11	6 4
May.....	30 11	10 3	13 7	8 4	2 9	3 5	2 10	9 4	2 7	8 2
June.....	31 5	9 4	12 6	8 10	2 7	5 4	5 9	10 9	4 4	8 6
July.....	33 11	10 6	19 4	13 2	2 5	7 1	5 6	17 7	3 5	15 3
August.....	38 1	16 1	16 4	12 9	4 1	5 4	5 9	13 8	3 3	13 11
September.....	53 7	20 3	13 1	11 7	8 3	5 9	6 2	10 4	5 0	15 8
October.....	70 8	41 1	33 4	13 1	10 7	7 6	5 3	16 0	4 6	14 1
November.....	68 0	32 4	25 1	10 10	10 9	4 5	5 0	12 4	4 10	13 6
December.....	75 11	17 7	11 1	10 7	7 4	3 4	4 6	7 7	5 9	8 5
1946—										
January.....	31 9	14 4	14 11	10 4	3 0	3 5	3 4	8 7	2 9	9 3
February.....	54 3	12 0	13 8	8 4	2 9	2 8	4 0	8 5	4 6	9 7
March.....	69 7	17 3	23 6	9 10	5 9	3 0	3 3	7 1	6 7	11 6
April.....	75 5	29 5	17 7	11 8	5 7	4 0	5 4	9 5	2 7	9 4
May.....	78 8	29 8	22 2	7 6	4 6	3 4	3 6	8 3	3 10	8 7
June.....	77 11	23 5	26 7	10 7	5 0	4 7	4 7	7 5	6 3	12 3
July.....	60 11	25 4	25 8	15 7	3 2	9 3	10 3	15 5	5 7	14 4

(a) Season 1 January to 31 December.

(b) Season 1 October to 30 September.

CROPS AND MARKETS.

Average Prices of Onions and Sweet Potatoes on Municipal Markets.

SEASON (1 July to 30 June).	ONIONS (120 lb.).						Sweet Potatoes. (120 lb.).		
	Johannesburg.		Cape Town.	Pretoria.	Durban.		Johan- burg. Table.	Durban.	Cape Town.
	Trans- vaal.	Cape.	Cape.	Cape.	Local.	Cape.			
1938-39.....	s. d. 8 3	s. d. 8 10	s. d. 7 4	s. d. 7 10	s. d. 8 6	s. d. 9 6	s. d. 5 7	s. d. 4 8	s. d. 5 3
1939-40.....	6 3	9 10	7 3	9 11	9 8	10 5	5 7	5 9	5 0
1940-41.....	12 5	12 3	9 10	11 11	11 2	12 7	7 3	6 4	5 5
1941-42.....	10 5	13 11	10 4	13 10	13 0	14 3	9 10	7 1	8 4
1942-43.....	13 8	14 0	12 6	14 7	12 9	14 5	9 8	8 1	8 5
1943-44.....	16 2	18 9	15 1	17 4	19 1	19 2	12 0	10 9	10 7
1944-45.....	14 7	18 7	14 8	18 1	18 8	10 5	17 3	15 1	16 3
1945—									
January.....	12 9	13 1	9 11	14 8	12 3	13 5	18 2	7 8	14 7
February.....	13 5	13 10	9 9	10 4	12 2	14 0	16 0	8 1	10 8
March.....	13 10	15 2	11 4	14 9	18 9	17 0	12 6	9 6	12 5
April.....	17 8	17 5	14 6	16 9	12 6	17 8	9 11	7 5	9 1
May.....	16 4	17 11	12 0	18 0	19 11	20 10	10 4	7 1	11 4
June.....	20 3	17 11	14 4	18 4	15 4	18 1	9 4	8 2	9 4
July.....	16 7	18 7	15 5	16 8	17 7	20 5	10 4	8 8	12 4
August.....	18 7	18 4	15 7	18 3	16 9	19 4	11 3	8 9	12 1
September.....	16 1	17 7	16 1	19 11	19 3	20 5	15 0	12 11	14 2
October.....	10 8	14 5	12 11	14 8	10 4	15 10	19 0	15 6	17 0
November.....	12 3	9 3	13 0	—	14 3	13 10	19 11	19 1	21 3
December.....	14 8	15 3	15 6	17 10	16 11	15 7	17 1	14 6	17 7
1946—									
January.....	12 0	12 1	9 7	—	11 7	13 0	17 1	15 6	17 3
February.....	12 3	13 8	11 1	13 1	15 2	9 11	17 3	10 3	17 2
March.....	11 4	12 4	9 9	12 10	12 9	13 5	18 5	14 8	14 8
April.....	12 1	12 10	11 3	13 10	15 1	14 9	15 2	17 4	14 7
May.....	13 6	13 9	11 9	13 9	12 10	14 7	15 8	15 6	14 5
June.....	14 7	15 5	12 2	17 1	15 11	14 11	14 11	14 8	15 1
July.....	11 10	14 3	12 0	15 0	15 2	15 6	15 2	15 2	17 4

Average Prices of Green Beans, Green Peas and Carrots on Municipal Markets.

SEASON (1 July to 30 June.)	GREEN BEANS (Pocket 20 lb.).			GREEN PEAS (Pocket 20 lb.).			CARROTS (Bag). (a).		
	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.
1938-39.....	s. d. 1 8	s. d. 2 3	s. d. 2 0	s. d. 2 4	s. d. 1 9	s. d. 1 2	s. d. 3 8	s. d. 2 6	s. d. 6 1
1940-41.....	1 11	2 9	1 5	2 8	2 4	2 3	5 9	4 11	13 4
1941-42.....	2 7	3 10	2 6	3 11	3 8	3 4	8 5	8 11	17 2
1942-43.....	3 1	4 3	3 0	3 3	2 10	3 9	5 1	8 9	13 2
1943-44.....	3 8	4 11	3 0	4 11	4 10	4 11	9 11	11 1	20 2
1944-45.....	3 7	5 1	4 1	4 9	4 1	5 5	8 3	9 11	19 10
1945—									
January.....	1 10	0 11	2 4	4 3	1 9	6 7	7 7	3 1	10 2
February.....	1 7	3 4	2 3	5 5	6 9	7 4	7 8	6 11	19 1
March.....	2 3	4 11	2 6	7 7	12 0	6 7	9 5	6 3	25 4
April.....	1 11	2 8	1 10	4 4	6 6	4 0	8 6	13 9	19 6
May.....	3 3	5 3	2 3	5 9	9 11	3 1	9 5	8 7	21 6
June.....	4 3	4 2	5 0	4 9	7 9	3 8	10 0	10 10	13 9
July.....	9 10	7 10	5 10	8 2	11 7	8 8	10 1	16 4	20 11
August.....	7 4	6 4	6 10	5 8	7 10	5 5	13 4	17 11	12 11
September.....	3 1	5 9	4 1	2 8	4 1	2 4	7 5	12 8	16 8
October.....	3 8	5 4	4 9	4 4	3 6	7 7	9 6	9 10	20 11
November.....	1 6	3 4	2 4	0 0	4 0	9 4	9 8	8 8	16 4
December.....	2 4	2 3	2 8	12 1	—	12 5	10 9	7 10	13 10
1946—									
January.....	3 4	1 11	5 6	8 8	10 11	14 7	9 8	6 2	16 0
February.....	1 11	—	2 3	6 5	—	6 4	7 3	7 11	14 1
March.....	2 10	1 1	2 5	6 1	—	3 4	8 10	8 1	23 10
April.....	2 7	3 4	3 1	5 7	—	4 10	10 2	9 3	24 2
May.....	1 9	3 0	2 2	7 2	8 10	5 10	7 1	6 3	18 8
June.....	1 10	2 0	2 8	4 8	4 1	5 7	4 2	7 6	11 7
July.....	3 2	1 11	2 2	2 7	3 6	3 4	3 8	4 8	7 10

(a) Weights of bags vary, but on the average are approximately as follows:—Johannesburg, 130 lb.; Cape Town, 90 lb.; and Durban, 120 lb.

Index of Prices of Field Crops and Animal Products.

(Basic period 1936-37 to 1938-39=100.)

SEASON (1 July to 30 June).	Summer cereals.	Winter cereals.	Hay.	Other field crops.	Pastoral products.	Dairy products.	Slaughter stock.	Poultry and poultry products.	Com- bined index.
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	
WEIGHTS.....	19	13	2	3	34	6	17	6	100
1938-39.....	92	107	96	89	79	102	106	92	93
1939-40.....	86	107	77	95	115	105	106	89	103
1940-41.....	109	113	106	156	102	103	110	104	108
1941-42.....	121	134	143	203	102	131	134	145	123
1942-43.....	160	149	144	159	122	147	167	173	146
1943-44.....	169	172	137	212	122	154	132	204	157
1944-45.....	184	183	160	280	122	177	172	187	163
1945—									
January.....	184	183	177	250	122	159	173	206	163
February.....	184	183	171	235	122	180	171	225	164
March.....	184	183	182	245	122	180	171	237	165
April.....	184	183	173	246	122	180	169	263	166
May.....	199	183	173	237	122	184	163	272	170
June.....	199	183	190	320	123	184	170	262	172
July.....	199	183	191	315	118	210	175	210	170
August.....	199	183	191	333	118	210	179	180	169
September.....	199	183	187	372	118	210	183	165	170
October.....	199	183	189	383	118	210	187	165	171
November.....	199	190	194	379	118	204	187	173	172
December.....	199	190	194	341	117	204	183	202	172
1946—									
January.....	199	190	191	349	118	204	179	233	174
February.....	199	190	158	308	118	186	175	256	171
March.....	199	190	160	283	118	186	171	277	171
April.....	199	190	176	299	118	186	168	320	174
May.....	250	190	170	286	119	186	165	332	184
June.....	247	190	178	285	119	213	164	295	183
July.....	240	190	182	306	120	231	168	218	181

(a) Maize and kaffircorn.

(b) Wheat, oats and rye.

(c) Lucerne and teff hay.

(d) Potatoes, sweet potatoes,

onions and dried beans.

(e) Wool, mohair, hides and skins.

(f) Butterfat, cheese milk and

condensing milk.

(g) Cattle, sheep and pigs.

(h) Fowls, turkeys and eggs.

Average Prices of Cabbages, Cauliflower and Tomatoes on Municipal Markets.

SEASON (1 July to 30 June).	CABBAGES (Bag). (a)			CAULIFLOWER (Bag). (a)			TOMATOES (Trays 15 lb.).			
	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.	Johannesburg.			
							N.M. No. 1.	Other.	Cape Town.	Durban.
1938-39.....	s. d. 3 10	s. d. 3 0	s. d. 3 10	s. d. 3 0	s. d. 1 8	s. d. 3 5	s. d. 2 2	s. d. 1 3	s. d. 1 3	s. d. 0 10
1940-41.....	5 10	4 8	7 1	3 11	4 3	5 3	2 7	1 6	2 1	1 2
1941-42.....	8 10	5 5	11 5	5 9	5 7	7 11	3 1	1 9	2 3	1 6
1942-43.....	5 6	5 11	9 1	5 0	5 9	7 6	3 4	1 10	2 1	2 7
1943-44.....	11 1	7 4	17 6	9 2	6 2	12 1	5 5	2 9	3 7	2 0
1944-45.....	9 7	6 11	13 5	7 5	6 6	9 8	4 1	2 0	2 8	1 9
1945—										
January.....	8 0	4 9	15 8	6 3	—	—	6 1	2 6	2 7	2 2
February.....	7 8	8 6	22 4	9 6	6 11	—	3 0	1 2	3 1	1 1
March.....	8 5	10 5	24 1	8 8	—	8 0	3 4	1 5	2 5	2 4
April.....	8 7	7 11	14 8	7 7	9 7	11 4	3 4	1 5	2 6	1 7
May.....	7 6	5 4	11 2	7 3	6 5	10 10	4 0	1 10	2 4	1 10
June.....	8 11	4 3	10 6	11 7	7 7	14 10	8 11	2 1	3 0	1 1
July.....	12 2	5 4	11 0	12 3	5 7	11 0	3 7	1 10	2 9	1 2
August.....	12 0	9 7	8 11	10 0	8 2	12 3	5 2	3 2	3 4	1 5
September.....	12 2	11 7	10 8	11 8	9 6	14 10	6 7	3 1	3 10	1 10
October.....	10 1	12 1	18 3	17 0	5 9	11 0	6 2	2 8	3 1	1 8
November.....	10 9	9 11	16 0	12 9	8 6	—	5 7	2 8	4 0	1 6
December.....	14 2	9 10	17 7	26 0	3 6	—	3 0	1 1	3 11	1 1
1946—										
January.....	9 7	8 0	14 8	14 5	9 0	—	4 3	1 10	2 5	1 3
February.....	7 3	9 1	18 1	10 10	6 6	—	4 2	1 7	1 11	1 8
March.....	8 11	7 3	14 4	7 2	9 8	3 4	6 2	3 8	2 6	1 6
April.....	9 10	5 8	9 0	6 7	15 4	12 4	8 1	3 6	2 8	2 0
May.....	8 4	3 4	7 7	7 2	5 3	8 11	6 3	2 11	3 8	2 3
June.....	5 10	2 4	11 0	7 7	3 1	12 1	4 2	2 0	2 10	1 5
July.....	7 11	1 10	9 9	8 6	—	11 3	2 2	1 1	2 3	1 0

(a) Weights of bags vary, but on the average are approximately as follows: For cabbages—Johannesburg, 150 lb.; Cape Town, 105 lb., and Durban, 90 lb. For cauliflower—Johannesburg, 100 lb.; Cape Town, 65 lb. and Durban, 85 lb.

CROPS AND MARKETS.

Index of Prices Paid for Farming Requisites.

Year and Month.	Imple-ments.	Ferti-lizers.	Fuel.	Bags.	Feeds.	Fencing Material	Dips and Sprays.	Building Material.
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
Basis—								
1936-38...	100	100	100	100	100	100	100	100
1942.....	123	157	140	206	136	229	117	168
1943.....	144	171	154	237	152	239	127	179
1944.....	161	184	156	307	155	240	134	184
1945—								
January...	159	204	156	310	162	225	136	181
April.....	159	204	156	311	163	224	136	181
July.....	159	204	156	321	169	225	135	180
October....	159	204	146	321	166	225	135	179
1946—								
January...	155	204	146	314	168	218	135	174
April.....	152	204	146	304	163	213	134	174
July (j)...	152	199	130	305	168	214	134	175

The following is the composition of the above groups. (The items are weighted according to their respective importance) :—

- (a) Ploughs, planters, seed-drills, harrows, cultivators, ridgers, mowers, binders, hay rakes, silage cutters, hammer mills, separators, windmills, shares, land sides mouldboards, mowers, knives, pitmans, guards.
- (b) Superphosphate, ammonium sulphate, muriate of potash.
- (c) Petrol, power paraffin, crude oil, grease, lubricating oil.
- (d) Woolpacks, grain bags, sail twine, binder twine.
- (e) Mealies, oats, lucerne, groundnut oil-cake meal, bonemeal, salt.
- (f) Fencing wire, standards, baling wire.
- (g) Bordeaux mixture, lime sulphur, arsenate of lead, cyanogas, Cooper's sheep dip Little's dip, Tixol cattle dip.
- (h) Corrugated iron, deals, cement, lime, flooring boards.
- (j) Preliminary.

CONTENTS



	PAGE
EDITORIAL:	
Weed Control—A National Problem	647
Dr. M. S. du Toit, Under-Secretary for Agriculture	646
ANIMAL HUSBANDRY:	
The Horse on the Farm—II. The Saddle Horse (Dr. P. J. Schreuder and F. B. Wright)	649
The Handling of Milk and Cream on the Farm—II. The Farm Separator (Division of Dairying)	699
FIELD HUSBANDRY:	
The Sweet Potato (Division of Horticulture)	662
The Pecan in South Africa (Dr. R. H. Marloth)	665
Controlling the Maize Stalk Borer with D.D.T. (E. E. Anderssen)	677
The Colorado Potato Beetle (C. P. v. d. Merwe)	707
POULTRY FARMING:	
Selection of Poultry for Egg Production(A. M. Gericke)	679
The Cost of Egg Production, 1944/45 (A. R. Havemann) ...	688
MISCELLANEOUS:	
Levelling Outfits for Farmers	676
Save Your Grain Bags	706
Nursery Quarantines	676

[NOTE.—Articles from *Farming in South Africa* may be published provided acknowledgment of source is given.]

FORD'S FOR SEEDS—A. FORD & Co. (Pty.) Ltd. AGRICULTURAL SEEDSMEN.

SEED CONTRACTORS TO THE UNION GOVERNMENT,
P.O. BOX 5701. CATALOGUES FREE JOHANNESBURG.

Dr. M. S. du Toit, Under-Secretary for Agriculture.

In September 1946, Dr. M. S. du Toit, Director of the Fruit Research Station at Stellenbosch, was appointed Under-Secretary for Agriculture in succession to Col. C. J. van Heerden, recently appointed as a member of the Public Service Commission. Col. van Heerden enters his new sphere of activity worthily equipped with agricultural knowledge and the general esteem of civil servants

and farmers. His successor brings to his new post a wealth of scientific knowledge and experience of agriculture with which to serve his Department and his country in a wider sphere.



Dr. du Toit was born in Malmesbury on the 28th of November, 1898, and spent his boyhood on his father's wheat and wine farm in the Stellenbosch district. He received his early school education at the Jongens Hoërskool at Stellenbosch, and later at Wellington where he passed the Matriculation Examination in 1915. After having taught mathematics at Moorreesburg for a few years, he entered the

University of Stellenbosch, obtained the B.Sc. degree in 1920, and went to Natal as lecturer in science and mathematics at Kearsney College. At the end of 1921 he was awarded a bursary for further study at the University of Cambridge, England, where he received the degree of Doctor of Science in 1924 on a thesis on the organic and colloido-chemical structure of soil. Although his earlier education had been focussed on pure chemistry, his thesis proved that he had become interested in soil and agriculture, and this new interest led to a 2 years' study under Sir John Russell at the Rothamsted Institute of Pedology.

In 1925 Dr. du Toit returned to the Union and for 3 years was engaged in the Division of Chemical Services on soil survey work in connection with irrigation schemes, paying special attention to brak problems. In 1928 he was appointed lecturer in agricultural chemistry at the University of Stellenbosch where he applied himself to research in connection with soil and soil-fertility problems of the winter-rainfall area.

As a result of his research on soil alkali under the Olifants River Scheme at Vanrhynsdorp, where he spent two years, he was awarded a Carnegie Fellowship of £750 for the study of irrigation in America and Australia. An educational tour extending over

FARMING IN SOUTH AFRICA

Vol. 21

OCTOBER 1946

No. 247

Editorial:

Weed Control—A National Problem.

SOIL conservation is to-day one of the chief topics of conversation in agricultural circles throughout South Africa, and perhaps throughout the world. Contour ploughing, terracing, strip cropping, compost, rotations, pasture management and many such terms and phrases are to-day familiar to the majority of those connected with agricultural production. But how many of us pause to consider the important part played by weeds in all parts of our country in robbing us of the very assets and resources which it is our desire to conserve?

South Africa has weed problems peculiar to itself and probably not equalled in any other civilized country. Not only have we the majority of the serious weeds which affect arable production, but in addition we have a wide range of poisonous and inedible plants and shrubs invading our veld which annually cause enormous loss and seriously limit its productive capacity. No comprehensive figures have yet been made available to show the annual losses, direct and potential, which occur as a result of weed encroachment, but the total would no doubt be staggering.

By competing with arable crops for the limited supplies of moisture and available plant food, weeds alone are reckoned to be responsible for losses of up to 25 per cent. in the possible grain production in this country, while the cultural practices necessary to control them are a very considerable item in the cost of production. Loss of value in agricultural products due to weeds, as, for example, the admixture of weed seeds in grain, burr in wool, tainting of dairy produce, etc., is a serious factor. Perhaps most important of all, however, is the lowering of the carrying capacity of our veld and the direct losses in stock due to deaths caused by the encroachment of inedible and undesirable plants and shrubs and poisonous plants.

Both exotic and indigenous plants are found among the weeds affecting our pastoral production. Of the former the following are among the most important:—prickly pear which, it is estimated, has already infested approximately one million morgen of valuable grazing land; jointed cactus which has overrun about 250,000 morgen of land in the eastern Cape Province; American bramble and *Lantana camara*, each rendering virtually unproductive areas of about 20,000 acres in Natal; and large infestations of hakea which are despoiling our beautiful mountains in the western Cape Province. Of our indigenous plants, thorn trees of a number of species have encroached to such an extent on veld in parts of the northern Transvaal, Natal, Zululand, the north-western and eastern Cape Province, that tens of thousands of morgen of good grazing land have been rendered practically valueless or had their carrying capacity greatly reduced. Such indigenous weeds as rhenosterbush, harpuis, bluebush and a number of others, have overrun huge areas of land and in various parts of

the country form the major agricultural problem. Poisonous plants, of which some of the worst offenders are gifblaar, gousiektebossie, senecio species, tulip, vermeerbos and slangkop, infest enormous areas in various parts of the country and, apart from causing heavy mortality in stock each year, throw large areas of land out of production during certain seasons.

Much has already been done to control some of the most important of our weeds. The huge infestations of prickly pear which have been a curse to farmers in the eastern Cape Province during the past century, are now fast disappearing and it is confidently expected will be largely under control by the end of the present year. Much remains to be done, however, and a national effort is required to deal with the remaining serious weeds and poisonous plants which hamper and threaten production in so many parts of our country.

The Department of Agriculture, to which weed control was entrusted in 1937 by the Weeds Act, is fully alive to the situation, and the problem of control is being studied from all angles. The war years, with their attendant shortages of man power, equipment and chemical weed killers, delayed rapid progress in this field. Now that conditions are again slowly returning to normal and supplies again appearing, an increased tempo in the application of control measures may be expected. Improved methods are being studied with results so promising that it is confidently expected that solutions will be found in the near future to many of our most difficult weed problems.

Our problems in this field are, however, enormous, and can only be solved by the whole-hearted and willing co-operation of the entire community. Weed control is, in fact, a national problem calling for national effort.

Dr. M. S. du Toit, Under-Secretary for Agriculture :—

[Continued from page 646.]

the years 1933—34 enabled him to study irrigation and farming problems in these countries with special emphasis on soil alkali and soil erosion.

On his return in 1935, he was first appointed Professor at the University of Stellenbosch and head of the Department of Agricultural Chemistry, and in the following year Director of the Western Province Fruit Research Station which has now become an independent institution of the Department of Agriculture.

In 1939 he was sent to England, Holland and Germany by the Union Government to study problems in connection with fruit, fruit production and research organization.

In 1942 he was appointed Departmental representative on the Deciduous Fruit Board, which enabled him to pay more attention to problems of the deciduous fruit industry. In 1945 he again proceeded on an official scientific visit to England, Germany, America and Canada, where he was the Union's delegate at the International Food Conference of the U.N.O. in Quebec, Australia and New Zealand. At the same time he made a study of the technical problems of agricultural research organization and the organization of the fruit industry.

With such wide knowledge at his disposal, backed by intimate experience of world affairs, Dr. du Toit, was, on his return in 1946, appointed Under-Secretary for Agriculture.

The Horse on the Farm.*

II. THE SADDLE HORSE.

Dr. P. J. v. d. H. Schreuder and F. B. Wright, Senior Professional Officers (Horses.)

AN absolute standard for the saddle horse does not exist. Saddle horses may belong to any of the following breeds and types, all of which differ from each other in certain particulars: the Thoroughbred, the Arab, the various American breeds of saddle horse (e.g. five-gaited, Morgan, Tennessee Walking Horse, Quarter Horse), the different breeds and saddle types of Europe, hunters, polo ponies and reinmounts.

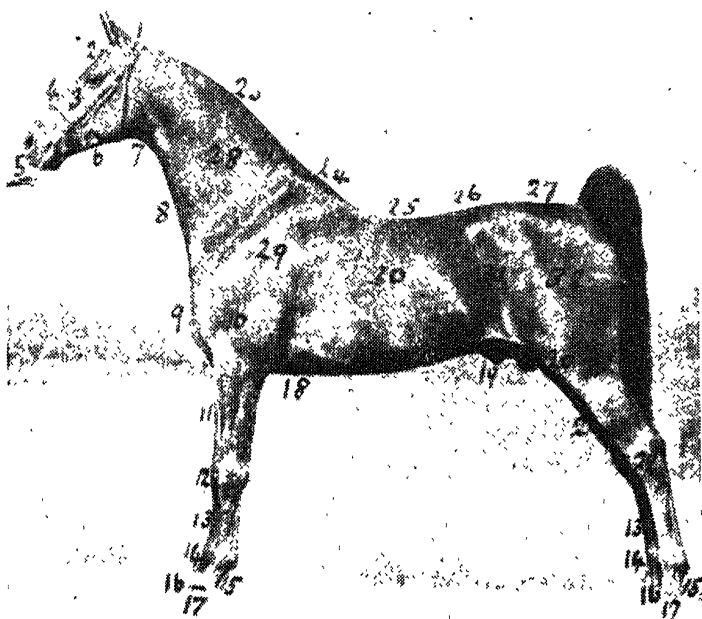


FIG. 1.—Parts of the horse.

1. Poll; 2. Forehead; 3. Face; 4. Nose; 5. Muzzle;
6. Jaw; 7. Throat; 8. Windpipe; 9. Chest; 10. Arm;
11. Fore-arm; 12. Knee; 13. Cannon; 14. Fetlock; 15. Pastern;
16. Coronet; 17. Hoof; 18. Brisket; 19. Sheath; 20. Stifle;
21. Gaskin or second thigh; 22. Hock; 23. Crest; 24. Withers;
25. Back; 26. Loins; 27. Croup; 28. Neck; 29. Shoulder;
30. Barrel or middle-piece; 31. Coupling; 32. Thigh.

[Photo from "Saddle and Bridle". Figures added by authors.

The foregoing list does not purport to be complete, but it is sufficiently comprehensive to illustrate the contention that considerable diversity of type exists among riding horses.

Nevertheless, all saddle horses possess certain basic features in common, and, if these points are appreciated and understood, it is

* The first article in this series appeared in the September 1946 issue of *Farming in South Africa*.

not difficult to assess the merits and demerits of the various breeds and types.

In this article a type will be described that, with some variation in size, would be equally suitable as a heavy-weight hunter, a heavy-weight polo pony or a remount—three types from which a high standard of utility performance is demanded. If we exclude the heavy hunter, for which there is little demand in this country, we may expect the other two types to be from 15 to 15.1 hands high, with extremes ranging from 14.3 to 15.2 hands, and a weight of 950 to 1,100 lb.

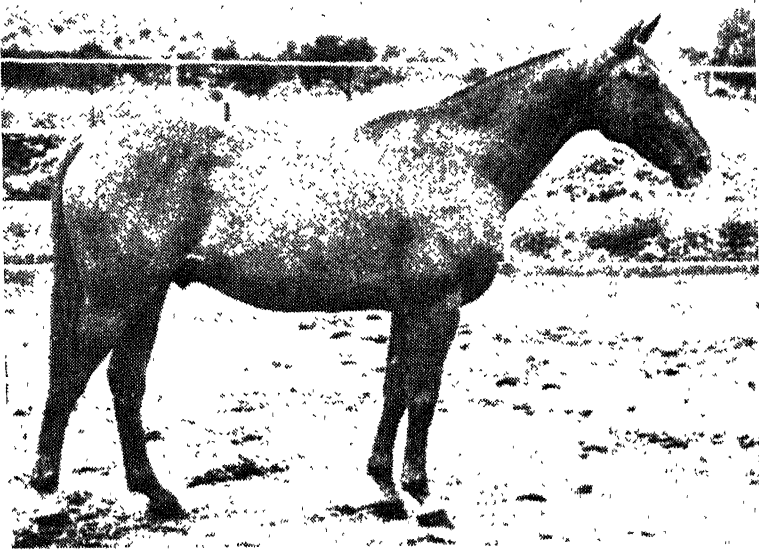


FIG. 2.—A fine type of South African bred saddle horse; combines outstanding quality and weight-carrying ability.

[Photo L. J. Liebenberg.]

In judging a horse it is as well to walk round the animal at a distance of several paces and view it from front, side and rear, in order to gain a general impression of the animal before proceeding to examine more minutely its various points; but in this article, for the sake of simplicity, the points of the horse will be considered in detail first, and a few general remarks will be made in conclusion.

The Head and its Parts.

The head should give the appearance of being in proportion to the rest of the body. A large heavy head is undesirable in a riding horse, because a neck of normal proportions will be unable to support the excessive weight of a heavy head at the proper angle necessary to ensure a comfortable ride, and the head will be carried too low. More frequently a large head will be found in combination with a short thick neck, which, as will be explained later, is very undesirable in a riding horse.

Furthermore, the head is an important indication of the breeding of the horse. A large head is an indication of draught blood, which, needless to say, is not wanted in a saddle horse.

An excessively small head may be found in a highly refined type of horse, but will generally indicate a lack of constitution. It will

not be found nearly so frequently as an oversized head. The head should give the appearance of leanness, with the bony prominences well defined.

The head in profile should show a straight face line, but the nose may show a slight concavity (dish). Nor will good judges condemn a tendency towards a Roman nose (convex face line), provided the rest of the head shows quality. The forehead should be broad and flat. A bump on the forehead between and above the eyes is very often a true indication of a roguish and unmanageable disposition.

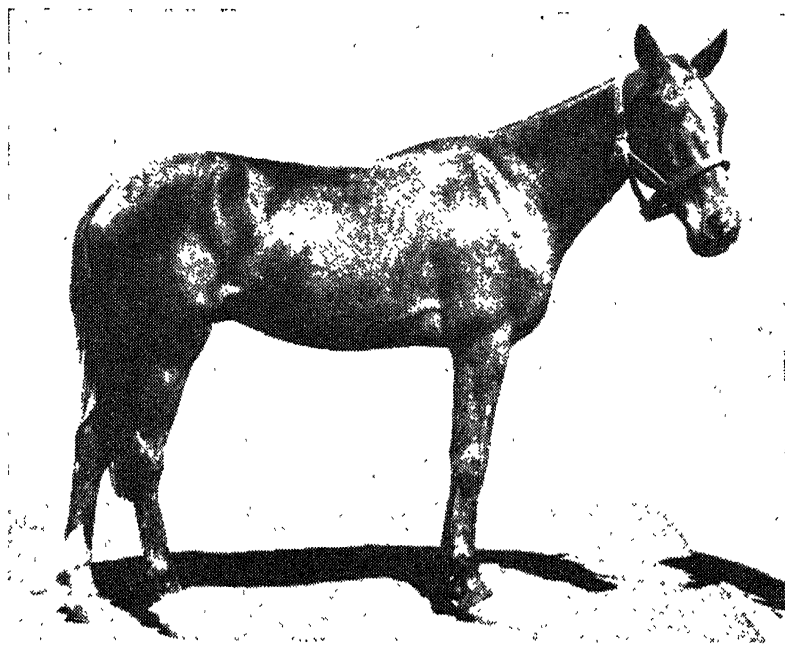


FIG 3.—A weak, weedy type: too high on the leg, too light middle-piece, and lacking constitution generally.

[Photo I. J. Liebenberg.]

The eyes should be large and kindly, with no tendency to be sunk into the head. Fine, black, hairless skin round the eyes is a sign of quality. Popular fancy ascribes all manner of evil to the horse that shows an undue amount of white about the eye. It is true that a kicker will often show a flash of white about the eye as it glances backward preparatory to lashing out at its intended victim; and most of us have seen a highly excited animal, frequently with its tongue over its bit, plunging and fighting its rider and at the same time rolling its eyes wildly and showing a good deal of white about them. But there is many a sedate horse with an iris smaller than usual, that may show a ring of white round the eyes without being any the worse in nature for this peculiarity.

The face of the horse should be covered with fine skin and there should be no fulness of the face bones. In a well-bred horse the veins, and often the larger nerves, may be plainly seen below the skin.

The muzzle should be moderately fine, with firm lips. The lower lip should not be pendulous. The nostrils should be large, with the edges well defined.

It is as well to open the horse's mouth to see that the upper and lower incisor teeth meet squarely. Horses are frequently parrot mouthed, i.e. the top incisor teeth overlap the incisor teeth of the



FIG. 4.—A fair but not outstanding front; good development of withers; good length of shoulder which, however, could slope more; muscular fore-arm; and a sufficiency of bone.

[Photo I. J. Liebenberg.]

bottom jaw to a greater or lesser degree. We have not seen the opposite type of deformity. It stands to reason that such malformations must lead to unevenness in the wear of the incisor teeth and make it difficult for the horse to graze properly.

The jaws of the horse should be deep and give the appearance of strength, without being thick and heavy. The space between the jaw bones should be wide at the angles of the jaw. Horsemen talk loosely of being able to put their fist between the branches of a properly conformed jaw, but this is an exaggeration, as any one may ascertain who likes to put the matter to the test.



FIG. 5.—A bad front; short prominent shoulder; poor development of fore-arm; and light bone. The neck also is too short and thick. [Photo I. J. Liebenberg.]

The ears of the horse merit some discussion because of the variety of opinions held on the subject. Ears may be wide apart or close together, short or long, and the points may turn in or not. What some advocate, others condemn. The truth of the matter is that the size, shape and setting of the ears are not points on which to pass or reject a horse, which in all other respects has good conformation. Each person should please himself in the matter of ears.

In general it may be said that the true pony breeds possess proportionately small ears.

On the other hand, the way the ears are carried is often a reliable indication of the horse's temperament. A horse that always carries his ears laid back is invariably an ill-tempered animal. An active, lively horse will make considerable play with its ears.

Any one who has done much riding will know that a good deal of what is going on in a horse's head will be apparent to its rider from the play of its ears.

Lop ears detract a good deal from a horse's appearance, and are supposed to indicate a placid disposition. They have no bearing on utility.

The poll of the well-bred saddle horse should be prominent.

The head to be avoided is the oversized one, with marked convexity of nasal bones, small eye and nostril, thick lips, pendulous lower lip, and long hairs hanging like a beard from the lower jaw.

The Neck and Shoulders.

One looks for length in the neck of the riding horse, leanness and a slightly convex crest. The neck should pass smoothly into the shoulders without any undue prominence of the latter at the point of conjunction. It should show a slight dip just in front of the withers. There should be no undue thickness of the neck where it joins the head. The underline of the jaw and neck should not meet at an angle—which will indicate lack of throat room—but in the form of a curve.

The importance of a long shapely neck and well-set head can hardly be over emphasized in a saddle horse, and for the following reasons. Before a saddle horse can be taught the elements of its job, it has to learn to collect itself at the rider's will. This is attained by raising the head and neck, flexing the latter just behind the poll and at the same time relaxing the lower jaw. This series of movements will bring the weight of the animal to a greater extent on to the hind legs and thereby lighten the forehand. A horse so collected is in the most advantageous posture to obey efficiently the signals of the rider.

A horse with a short neck has not the range of head movement to obtain to perfection this balanced position, and a horse without throat room is in much the same straits, as it is unable to flex properly. A horse with too thick a neck is not taught to flex easily, or to obey lateral pressure of the rein on the neck.

A horse which has a short neck in addition to a thick neck combines all the disadvantages enumerated above.

A long flat sloping shoulder is most desirable in a saddle horse. Such conformation contributes largely to the length and springiness of the horse's stride. As has been previously mentioned, there should be no pronounced bulge at the junction of neck and shoulder, nor should the region of the shoulder joint give the impression of undue massiveness. The top of the shoulder should fit snugly against the withers without any massive muscling. The withers themselves should be prominent and extend well into the back of the horse.

It is, of course, possible to get too high and too narrow a wither—a most undesirable feature owing to the danger of the wither extending too far up into the gullet of the saddle and becoming injured through saddle pressure.

This condition is much accentuated when the saddle muscles immediately behind the shoulder are wasted or poorly developed.

Behind the shoulder blade and above the forearm is the massive triceps muscle. This should be large and prominent.

The Forelimbs and Feet.

The forearm of the horse should emerge well forward and close under the point of the shoulder. A horse so conformed is able to use his forelegs to better advantage than is an animal whose forelegs come out far back under the body.

The elbow should be well developed and there should be plenty of play between the elbow and the side of the chest. The forearm can scarcely be too long or too well muscled.

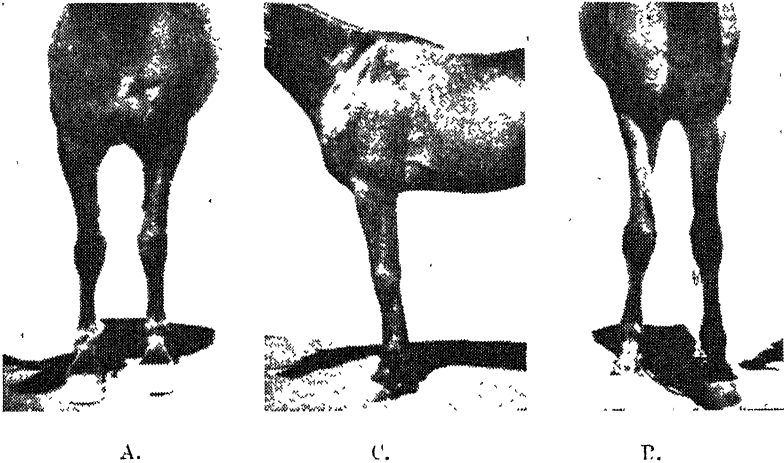


FIG. 6 A.—Good chest development. B.—Poor chest development. C.—Side view of B, which confirms the woody appearance of this horse.

[Photo I. J. Liebenberg.]

The knee, when viewed from the front, should be deep, broad and clearly defined. It should be broad from front to rear. It should give a clean "feel" when handled, the desired condition being brought about by a thin skin and absence of all puffiness.

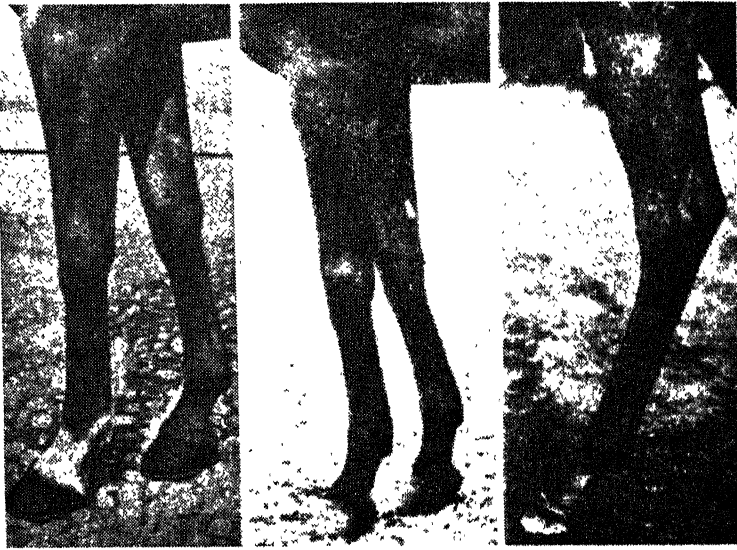
While the forearm should be long, the cannon should be short and well developed. The quality of the bone must be judged largely from the feel and external appearance. Coarse bone goes with thick skin and coarse hair, and fine bone with the opposite conditions. The tendons should be well developed and tense, and stand out clearly. The suspensory ligament should likewise be clearly defined and the space between ligament and tendons should not be "filled."

The tendons and cannon bone should be parallel to each other. It is a common fault in horses to be "tied in" below the knee. Here the circumference of cannon and tendons just below the knee is less than the circumference just above the fetlock. When a horse is possessed of well developed good quality cannon bones and well defined parallel tendons, it is spoken of as having good flat "bone". It will be observed that the term "bone" includes both actual bone and tendon, and the measurement of good bone, which is taken as the circumference of the leg immediately below the knee, is generally accepted as about 8 inches.

Many good horses that possess fine dense bone, do not make this measurement.

Long cannons and light bone are common faults in horses, especially in horses where height is attained through disproportionate length of leg. It is especially to be condemned in a weight carrier.

The fetlock joint should be large, flat and clean, but the term must not be construed to mean the large, round, coarse joints of the underbred horse. The back of the fetlock joint, which is formed by the two sesamoid bones, should especially be well developed as these bones form an important attachment of the suspensory ligament.



A. B. C.
FIG. 7. A.—Good fore-legs. B.—Over at the knees. C.—Good gaskin and hock. The leg is advanced and the illustration does not depict a sickle hock.

[From: "Points of the Horse" by H. H. Hayes.]

The joint should be free from puffiness (wind-galls). An excess of hair at the fetlock joint is a sign of common breeding. Good length and slope are the qualities most desired in the pasterns of a riding horse. A slope of from 45° - 50° is acceptable. Good length will compensate for uprightness to a certain degree, but a pastern that is both short and upright is a complete disqualification. Pasterns of excessive slope and length throw undue strain on tendons and ligaments, and may even strike the ground, with subsequent injury during fast work.

The importance of the foot is recognized by all horsemen. Not only is the foot subject to great strain in its natural state, but it must also suffer from the interference of man in the practice of shoeing.

In its unshod state the foot of the horse is so constructed as to absorb a good deal of the shock that is inseparable from fast progression. It stands to reason therefore that the foot should, within reason, be well developed in size so that this mechanism can work to the best advantage. Mule-like feet are undesirable in the horse. So are feet of unequal size or shape.

The horn of the wall should be thick, hard and tough, and in this respect it is generally held that dark horn is superior to white.

The outline of the forefoot should be more or less circular when the foot is viewed from below. The sole should be concave. Flat soles are easily bruised. The frog should be well developed so that the heels are fairly wide apart. The cleft of the frog should be no more than a slight depression and should not extend deep into the frog.

Viewed from the side the line of the hoof should be straight and form approximately the same angle as the pasterns in relation to the ground. The heels should be moderately high. The inner side of the hoof is more upright than the outer side, and the inner side of its ground surface is less curved than the outer.

The size of the coronet should be in proportion to the size of the foot. An excessively small coronet will indicate poorly developed bones of the foot.

The horn of a healthy foot will have a dull glisten, and should be free from pronounced rings or cracks. Horses running at grass in indifferent condition will often show cracks extending a variable distance upward from the bearing surface of the foot. These will often grow out when the horse's general condition improves and attention is paid to the health of the foot.

A concave toe line and marked rings on the wall of the hoof are a pretty good indication that the horse has suffered from a previous attack of laminitis.

Forelimbs in Relation to Body.

Having dealt with the forelimb in detail, we shall now consider it in a general way in its relation to the body.

The width between the forelegs of the riding horse should not be great. On no account should it approach the width as seen in a heavy draught horse. Too wide a chest leads to clumsiness of movement. On the other hand, a horse that is required to carry weight may be permitted a somewhat greater width between the legs than one expects to find in a racehorse.

The forearms will be found to slope very slightly inward to the knees. The cannons and pasterns will be parallel so that a plumbline dropped from the front of the shoulder should form a line down the middle of the knee, cannon, pastern and foot.

There are of course many deviations from this perfect conformation. Thus the horse's knees may be unduly close together, giving a knock-kneed appearance, or more rarely they may be too far apart, giving a bandy appearance. More common than the foregoing is the condition where the limbs tend to approach one another from the chest downward, so that the space between the feet is less than that between the forearms, or the opposite condition seen chiefly in weak narrow-chested horses where the space between the feet is greater than that between the upper portions of the forearms.

Commoner still are deviations from the pastern downward, resulting in turned-in or turned-out toes. A horse that turns its toes in, will throw the foot outward when trotting; this condition, besides causing an uneven strain on the joints from the pastern downward, transmits an unpleasant rolling feeling to the rider, which is, moreover, very much accentuated when the horse is trotting downhill.

A horse that turns its toes out is, in addition to having the uneven strain imposed on the lower joints of the limb, very likely to strike the fetlock of the supporting forelimb at the walk or trot (brushing).

When viewed from the side the forelimb of a well conformed horse standing at attention on level ground with the head normally raised will slope slightly backward and downward. A line from the middle of the top of the forearm to the middle of the fetlock joint will pass through the middle of the knee.

If the horse stands with his forelegs too far under him, the condition is spoken of as "standing under".

We cannot recall ever having seen a horse whose normal standing position was opposite to that described in the last paragraph.

Horses are sometimes taught to stand with the forelegs thrust forward and the hindlegs stretched back on shows, or in order to give a false height when being measured. They will also bring their hind legs under them and thrust their forelegs forward in order to relieve the weight on the forefeet in such painful conditions as laminitis, but the posture is not a natural one.

A common fault in the forelegs is the condition known as "calf knees" or "back at the knee". Here the forelimb, when viewed from the side, has a concave front profile, due to the bones of the arm and cannon being set at an angle to the knee instead of in a straight line. Such conformation throws an undue strain on the tendons and ligaments of the forelimb.

The opposite condition, "over at the knee", may be due to contracted tendons and is then a serious fault, or it may be congenital. The latter is quite common in Thoroughbred horses, and, if not pronounced, is not a serious condition as some text-books would have us believe. Many a racehorse standing over at the knees finishes a successful racing career quite unaffected by this abnormality, in spite of the great strain that training and racing throw on the forelimbs.

The Chest Cavity.

The chest cavity contains the heart and lungs, and as these organs are put to a considerable strain in a fast working animal such as a saddle horse, it is desirable that they be developed to their fullest extent, and that the chest cavity be as capacious as possible. It is important that the chest capacity be obtained by depth rather than breadth, because, as already explained it is a disadvantage for a riding horse to be wide in the chest. Apart from this factor, there is another important consideration. The riding horse is required to carry a saddle securely strapped to the body in such a way as to cause no injury to the animal itself. If the front ribs were not comparatively flat, but started to increase markedly in curvature immediately behind the shoulder, the girth would slip forward until it reached the recess between the elbows and the chest wall, with consequent galling of the animal.

Behind the girth one likes to see the ribs well sprung and deep; in fact, the last ribs can scarcely be too well sprung or deep. It is highly undesirable that the back ribs should be too short, giving the animal a greyhound-like appearance. Such conformation is spoken of as herring-gutted or wasp-waisted.

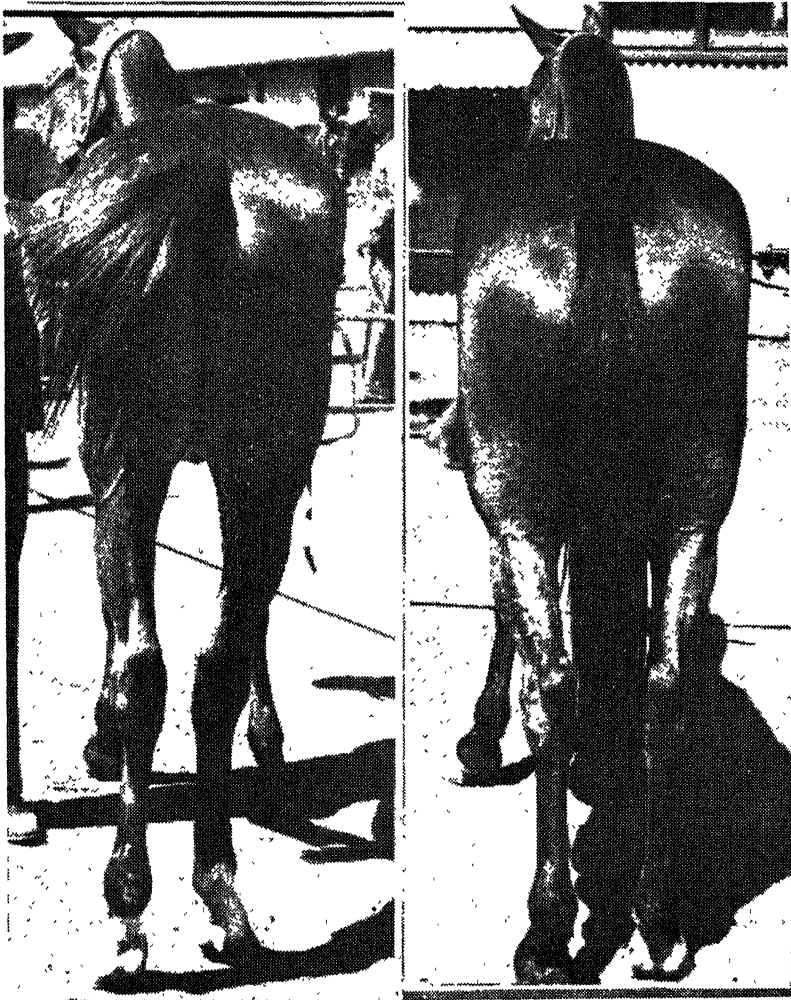
It is desirable that the space between the last rib and the point of the hip—the coupling—be as short as possible.

The floor of the chest is formed by the brisket, and the shape of the brisket will largely determine how the girth is carried. If the brisket slopes upward toward the elbows, the girth will naturally work forwards and upwards; if the brisket is too short, the front edge of the girth will be in danger of galling the horse inside the elbows. The brisket should therefore be of good length. Viewed

from the side, the brisket will generally be found to show a shallow notch just in front of its junction with the lower surface of the abdomen. The girth will naturally lie in this notch, so that, if it is well behind the elbows, there is no danger of the horse galling.

Back.

A short straight back is the ideal conformation for a weight carrier, but a slight upward slope towards the croup is permissible. Too pronounced an upward slope resulting from a croup higher than



A. B.
FIG. 8.—A contrast in the hindquarters. A.—Very bad. B.—Very good.
[Photo I. J. Liebenberg.]

the withers is not desirable, as every stride the animal makes in motion, and more especially at the canter and gallop, forces the saddle forward against the shoulders, thus interfering with the free play of the shoulder blades.

A certain amount of discretion must be used in the matter of backs, and a truly made horse should not be rejected because his back is somewhat longer than the ideal. If a back is both long and hollow it should certainly be avoided. A markedly roached back should be rejected, but one need not be deterred by a slightly roached back.

The back should be well muscled, because the back muscles, quite apart from bearing the weight of the rider and acting as a cushion between the rider and the upper portion of the ribs, also play a great part in lifting the forehand during progression. The back muscles are often poorly developed just behind the shoulders, which causes the saddle to lean against the shoulder blades and interfere with its free movement. While this is not such a bad fault when the ordinary type of saddle with stuffed panels is used, it is a serious disadvantage if a military saddle has to be used, as the burrs (forward projection of the side bar) will rapidly cause a saddle gall if they come up against the play of the shoulder.

Loins, Croup and Tail.

Between the back and the croup are the loins. These can scarcely be too short, too broad or too well muscled. This conformation is essential to a weight carrier. No horse with long, slack, poorly muscled, narrow loins will carry weight over a long distance for any length of time.

The croup should be broad, long, rounded and well muscled. The slope towards the tail should not be excessive, but the extremely level croup as seen in the five-gaited American saddle horse is not desired in a weight carrier.

The points of the hips should not protrude or have a "ragged" appearance; this conformation is unsightly, but does not really detract from the horse's utility.

In many Thoroughbreds the croup is comparatively narrow and long, with great muscular development of the thighs, but in a utility horse where the development of the thigh muscle rarely approaches that of a trained race horse, a broad, well muscled croup is desirable.

A horse with a steeply sloped croup is spoken of as being goose rumped. This conformation is unsightly, but scarcely affects the utility of the working saddle horse.

The tail looks better if set high. Too low a set of tail is regarded as an indication of inferior breeding. The dock of the tail should be well developed and the muscles strong. The strength and thickness of the dock is quite a good indication of the constitution of the animal. The hair of the tail should be fine. Thick wavy hair is a sign of cold blood. The same remarks apply to the hair of the mane.

The Hind Limbs.

Viewed from behind, the thighs should fit close together and give the appearance of depth. They should drop straight down from the hips and not taper inwards. Well muscled race horses will often measure more through the thighs than across the hips. Seen from the side, the thighs should show breadth and depth. The posterior line of the thigh should come well down on to the gaskin.

The gaskin can scarcely be too broad or too well muscled. Its breadth will depend largely on the development of the point of the hock, so that, if the gaskin be well developed, the hock will also be. It follows, therefore, that the hock should be large. It should, of course, be free from any puffiness, and a thin skin should be closely

applied to the underlying bony structures. The hind cannon is larger and broader than the fore cannon. It should drop straight down from the hock, and be as clean and free from puffiness as the fore cannon. A common fault is a tied-in appearance below the hock, or undue lightness of bone.

The pastern in the hind limb is shorter and steeper than in the forelimb.

The hind foot is steeper, narrower, more pointed at the toe, and the sole is more arched and the frog narrower.

In examining the conformation of the hind limb as a whole we shall find that in a truly conformed horse a line dropped from the point of the buttock perpendicularly to the ground will pass down the centre of the hocks and cannons. The hind legs should not be unduly far apart.

Deviations from this normal position are the following: cow hocks, where the hocks are turned in and the points approach each other; turned out hocks, where the opposite conformation is seen. Of the two, cow hocks are less objectionable. The hind legs may gradually converge so that the feet stand very close together. Such horses are liable to brush.

From the side a plummet line from the point of the buttock will pass down the back of the hock and the cannon. A deviation from this position is that of sickle hocks, where the hock is bent and the cannon directed forward. A horse is said to have his hocks too far behind him when they stand behind the plummet line mentioned above.

The height of a riding horse will largely be determined by the length of the legs. Thus a race horse of 16 hands may be no deeper from wither to brisket than a heavy-weight polo pony of 15·2 hands, the difference in height being due to superior length of the leg in the race horse, which is a factor conducive to speed. Length of leg, however, is undesirable in a horse that has to carry a great weight for long periods, and such a horse will give the impression of having comparatively short legs and a deep body.

Colour.

The colour of a horse has little bearing on its utility, except in the case of an albino, i.e. a white horse with an unpigmented skin. As skin pigment has a very marked influence in counteracting the harmful influence of the sun, an unpigmented skin in a land of bright sunlight is undesirable.

There are, of course, innumerable prejudices against and in favour of certain colours and markings. To mention only a few beliefs:—

Chestnuts are hot-headed; blacks are soft; roans are hardy; four white stockings are never found in a good horse, etc.

It is certain, however, that no scientific tests have been made on any exhaustive scale to test the matter out. Of course, there is no reason why a man should not exercise his own preference in the matter of colour and markings, but from the point of view of utility it is probable that the truth is adequately summed up in the expression "a good horse is never a bad colour".

The Sweet Potato.

Division of Horticulture, Pretoria.

IN order to conserve stocks of oaten products and other foods which are in short supply, and for which sweet potatoes could with advantage be used as a substitute, particularly in ration scales, an appeal is made all farmers in suitable areas to increase the production of this vegetable in an effort to broaden the scope of foods available for the national diet.

The sweet potato (*Ipomaea batatas*) has many uses and is a valuable food and fodder crop in many countries. Its yield compares very favourably with that of potatoes, it is easy to grow, and experiences a fairly good demand which could be increased by growing the proper types and varieties and by introducing better storing and marketing methods. Mostly the dry, floury and moderately moist types are preferred.

Climatic Requirements.

The sweet potato is a perennial, deep-rooting plant generally cultivated as an annual. The plant is sensitive to frost and grows best in a warm, moist climate. It can also be grown successfully in the colder parts of the Union, provided early-maturing varieties are used and planted in accordance with local conditions.

Localities.

The most favoured localities for the crop are the Transvaal lowveld (2,000 to 4,000 feet), Transvaal middleveld (4,000 to 5,000 feet) and the coastal belts of Natal and the Cape Province.

Types.

There are two groups, one producing tubers with a dry, mealy texture and the other a watery, soft, sweet pulp when cooked. Some varieties have yellow flesh, others white, while the skin colour varies from pure white to purple. Those with yellow flesh have a higher carotene content (the precursor of vitamin A) than white-fleshed varieties. There are many varieties which mature in three months to six months. The most common varieties cultivated in South Africa are Early Butter, Port Natal, Early White, Borrie, Rondeblaar and Virovsky, the latter variety being one of those introduced from Russia where many new varieties have been developed.

Sweet-potato plants are tender to frost and are, therefore, essentially a summer crop.

Methods of Propagation.

The usual methods of propagation are from "slips" (rooted growths) and from cuttings.

"Slips" are obtained by placing selected tubers close together, but not touching, in a specially prepared sandy bed during August, covering them with 2 inches of sand and watering frequently. Two bags of tubers should provide sufficient "slips" to plant a morgen. Where protection from frost is necessary, long grass or hessian

should be spread over the beds. In four or five weeks the new growths will appear, when another inch of sand should be spread over the bed. When the "slips" are about six inches in length, pulling may commence, and if the tubers are not disturbed, it should be possible to pull "slips" every second week up to December.

Cuttings may be obtained from the growth of early planted "slips" or from vines of the past season, which were collected and carried over under suitable conditions. For planting, the vines are cut into lengths of 9 to 12 inches. Each cutting should have at least three eyes or buds, two of which are buried. One bag of cuttings, stripped of leaves, holds approximately 1,000 cuttings 18 inches long, and weighs 75 lbs. The number of cuttings required to plant one morgen, spaced 3 feet by 18 inches, is 20,000 or twenty bags of cuttings. It is generally believed that if the cuttings are made longer than 12 inches and too many buds are buried, an excessive number of small roots in proportion to large ones results. Cuttings wilted in the shade for a day or two still root readily; in fact, many growers recommend this practice.

Climatic and Soil Requirements.

So far only early-maturing varieties can be grown with success in the inland frost areas, but most varieties do well along the south and east coast and in the Transvaal lowveld.

The plants withstand drought very well, although plenty of moisture during the first few months increases the yields. Under a fair average rainfall or irrigation good yields are obtained.

Soils that have been well ploughed and cultivated for other crops should be selected for sweet potatoes. Light sandy or loamy soils, enriched with well-rotted kraal manure or compost, should produce tubers of good quality. Heavy black or stiff clays should be avoided. Generally, an application of 10 tons of kraal manure or compost, together with a light application of artificial fertilizers, i.e., 600 lb. superphosphate plus 100 lb. sulphate of potash per morgen, will show a marked improvement in the yield. Heavy applications of fertilizers are likely to produce excessive leaf growth but few tubers.

Improvement of Type and Yield.

To improve the type and ensure heavy yields, it is recommended that selection should be practised at harvesting. At this time the tubers of plants producing numerous uniformly-shaped tubers close to the stem should be set aside for future use. Tubers of each plant should be stored separately through the winter and be inspected occasionally for storage behaviour. Only those groups which remain sound should be used for propagation purposes. In this way a great improvement in yield and quality can be effected.

Spacing, Cultivation and Irrigation.

Unless the field to be planted is comparatively level, the furrows should be made along the contour to prevent soil erosion.

The usual spacing in the field is for the rows to be 3 feet apart and the plants 18 inches apart in the rows. The slips should be firmly set 3 to 4 inches deep on ridges formed by ploughing four

furrows up to one another, leaving a depression in between for irrigation. The soil should have time to settle after ploughing and be in a moist condition, otherwise the planting should be followed immediately by an irrigation.

During the first few months of growth the soil between the plants should be kept loose and free of all weed growth by shallow cultivation. Irrigations should be applied only when necessary, since too much water causes vigorous vine growth and poor yields.

Under normal conditions the tubers will start forming and swell rapidly during the autumn, lifting and cracking the soil around the base of each plant.

In areas where sweet-potatoes are subject to attack by tuber moth the growing of early-maturing varieties is especially recommended and attention should be given to the covering of the tubers during the period of growth.

Harvesting.

For immediate domestic use, tubers may be lifted when desired, though somewhat immature. For marketing and storage purposes the tubers are usually harvested as soon as the first frost or cold weather occurs. At the correct stage of maturity, the tubers should not discolour when cut through.

Lifting should be done carefully, as any injury to the tuber causes decay. The tubers are exposed to the sun for a few hours to dry and harden somewhat, then carefully carried in baskets to the storage shelter, where they should be stacked in small heaps on straw to undergo a sweating period of from 7 to 14 days. The sound tubers are then graded to size, shape and colour, and marketed, or stored between layers of straw for future use.

Although it is a common practice to allow the crop to remain in the soil during winter, the tubers are liable to rot should the soil become too wet at any time. Where this field method of storage is adopted, all top growth should be removed immediately it has died down, to prevent rotting.

Sweet potatoes, after being cut into small sections and parboiled, can be successfully dried in the sun and stored for future use.

The tubers, when mature, provide a valuable nutritious food suitable for human beings and stock, being rich in crude protein and soluble carbohydrates.

Yields.

Yields vary according to variety, nature of the soil, climatic conditions and time of planting. An average of 15 tons per morgen can be expected, and yields of up to 40 tons have been recorded.

No serious pest or disease is experienced in South Africa, though the caterpillar of the convolvulus hawk moth occasionally does damage to the leaves. Control measures such as spraying with arsenate of lead and hand picking are effective.

The Pecan in South Africa.

Dr. Raimund H. Marloth, Officer-in-Charge, Subtropical Horticultural Research Station, Nelspruit, Eastern Transvaal.

KNOWLEDGE regarding the pecan nut and its culture in the Union of South Africa has not increased as much as was expected since Tribolet, a former Chief Horticulturist, published a pamphlet in 1921 "to awaken the interest in some of our more progressive fruit-growers who may see fit to take up the culture of the finest edible nut grown in any part of the world". This interest has now definitely been awakened, and many thousands of trees have been planted during recent years. It is hoped that the information



FIG. 1.—Thirty-year-old Curtis pecan trees on river-bank soil, E. Transvaal. First tree yielded 240 lb. of nuts in 1943.

contained in this publication will be of assistance in guiding prospective growers. While, as is the case with the development of all new fruit industries, practical experience brings forth much fresh knowledge, it would be unwise not to take cognizance of such facts as are already known, especially fundamental ones; ignoring these may result in great disappointment and loss of original financial investment plus expected returns after waiting for years following the planting of new orchards.

History.

A native of certain southern states of North America, growing wild in territories around the Gulf of Mexico, the pecan (pronounced *pe-can'*) belongs to the same natural order as the walnut, *Juglandaceae*, and has now the accepted botanical name *Carya illinoensis*, replacing the formerly used *Hicoria pecan*. From the millions of native trees growing wild along river banks and in well-watered fertile valleys selections were started about a hundred years ago, and vegetative propagations have increased to such an extent that in 1944 out of the total production in the United States of over 150

million pounds of nuts, some 61 million came from budded, grafted, and top-worked trees of improved pecan varieties. With the coming into full bearing of the many thousands of acres of improved varieties planted in states where the pecan has been found to thrive after its introduction, the pecan may possibly displace the walnut in commercial importance.

According to R. A. Davis in "Fruit Growing in South Africa", the pecan was introduced into the Union by Mr. Wilkinson, a nurseryman in Natal, towards the end of last century, and some of these trees are still thriving. Since then numerous importations of named varieties have been made, and also scattered plantings of seedlings set out. One of the main reasons for the slow spread of these varieties throughout the Union appears to have been the lack of easy success in the vegetative propagation by nurserymen importers up to a few years ago. A contributory reason was the lack of demand for the trees by the public, due to their not realizing the commercial potentialities of this nut, and, as with all new fruits, not knowing in which areas and of which varieties commercial plantings assured of success could be made. The largest of these commercial plantings in the Union, totalling now about 6,000 trees, was started in 1913 as a trial by Messrs. H. L. Hall & Sons, E. Transvaal. Such is the interest to-day in this nut that the establishment and extension of orchards throughout the country appears to be limited only by the number of trees nurserymen are able to supply.

Growing Requirements.

The pecan is a deciduous tree which has a long life, seedling trees over 100 years old being known. The tree grows to a great size, trunks of more than 23 feet in circumference, heights of 180 feet, and spreads of 125 feet having been recorded. The three main factors to consider in deciding whether the pecan is suited for commercial planting on any particular site are soil, water supply, and climatic environment; a combination of the optima of these for the pecan is usually found in valleys of large rivers at low and medium elevation in subtropical countries. In the Union it appears that the most promising areas for large-scale production of the pecan are the eastern and north-eastern lowveld of the Transvaal, the lower elevations of Swaziland and Zululand, and the coastal portions of Natal. The eastern and north-western Cape Province, and Orange River basin areas have very likely but unknown potentialities.

Soils.—While the pecan will make satisfactory growth and produce some nuts on any fertile well-drained soil, the fact that it is tap-rooted makes it essential that the soil be deep and that there be a complete absence of impervious layers of clay, oukclip, or hardpan if best yields and longevity are to result. More important than the drainage of surface water to allow aeration of the first few top feet of soil is the sub-surface drainage, for a water-table closer than 10 feet to the surface will not permit the development of a normal root system, particularly in older trees. Most of the best trees in the Union are to be found on deep sandy loam alluvial soils along river banks. (See Figs. 1 and 2.)

Water Supply.—Despite the requirement as regards drainage, the pecan does better than other nuts on heavy, temporarily wet soils, probably because best tree growth and regular good yields of well-filled nuts depend on the availability of an abundant supply of soil moisture the whole year round. This condition pertains under

natural conditions in only relatively small areas, and as the water requirement of the pecan after it has come into leaf, is far greater than that of other tree crops such as citrus, natural rainfall must usually be supplemented with a sufficient supply of irrigation water. Periods of shortage of water from the middle of the dormant season onward will affect progressively (a) the number of flowers borne following their formation during August, (b) the set of the nuts during October-November, (c) the development in size of the set nuts in December, and (d) the kernel development of the nuts in



FIG. 2.—Seven-year-old pecan orchard (H. L. H. Stuart variety) on river alluvial soil, E. Transvaal.

February. The partial failure of all or any of these will reduce the final profit to the grower. Actually, during the blossoming season irrigation is preferable to rainfall, since rain prevents the successful pollination of many flowers.

Climate.—The pecan tree, irrespective of variety, will grow well under extreme climatic conditions, provided the two foregoing requirements are fulfilled. For commercial nut production, however, a profitable return will be obtained only when varieties suited to the climatic conditions pertaining are planted. For instance, there are trees on the highveld of the Transvaal and Orange Free State which are growing well, but they do not crop. Possible winter injury to the dormant tree is not a limiting factor in the Union, but temperature plays its part in that, where there is a short growing season due to cold winters, only early-maturing varieties will succeed, and, where mild winters prevail, only varieties with a low chilling requirement during the dormant season will give good yields. The pecan tree, if properly trained when young, does not suffer wind damage easily, but high dry winds during the blossoming period (October-November) will cause the receptive parts of the female flowers to dry out quickly, thereby reducing the length of pollination time, with consequent smaller set of nuts.

From August to February there are specific periods for the development and functioning of each part of the nut, and unfavourable growing conditions at any time during these periods will adversely affect the quantity and quality of the final harvest during May-June.

Varieties.

The present success of the pecan industry in the United States can be ascribed largely to a continued study of varieties. Nurserymen and growers do not hesitate to discard an obsolete variety in any given particular area when a better one proves itself. At one time or another more than sixty varieties have been tried out commercially in various States; Standardized Plant Names lists 112 named varieties, but of these less than two dozen are now being propagated throughout the world for large-scale planting, certain varieties being best suited for varying climatic conditions. Recently in Georgia, U.S.A., only five varieties were recommended for commercial planting in all sections of the State, viz. Mahan, Schley, Stuart, Success and Frotscher.

In determining the suitability of a variety for any particular area, judgment is usually based upon the following factors in their order of importance—low susceptibility to scab, high yield, quality of meat, filling of nuts, thinness of shell, and size of nuts, with more attention now gradually being given to the last factor. At present, with the demand far exceeding the supply in the Union, buyers do not discriminate between varieties, whatever their quality, thinness of shell, or size of nut, but it is considered that the time will come when many of the varieties already planted and being planted will have to be disposed of to the confectionery trade at prices well below those obtained for better quality and larger nuts, or the trees will have to be top-worked to better varieties.

The meagre knowledge available to-day as to which varieties should be planted in different parts of the Union results from the past performance of relatively small numbers of trees of a limited number of varieties imported at various times during the past thirty years or so, and from younger trees propagated from these importations and distributed to other areas. At the Subtropical Horticultural Research Station, Nelspruit, E. Transvaal, a pecan variety orchard was started in 1939, and already 42 varieties and selections are being tested out. Nurserymen in other areas have also increased their own varietal plantings, and thus it should become possible within a few years to obtain fuller information as regards varietal performance throughout the Union.

Authorities have used various systems in the past to differentiate between the main types of pecans. One is to divide them into the Western, those originating in the western part of the pecan belt in the United States and practically all being very susceptible to pecan scab when grown in more humid regions, and the Eastern, which include the greater number of varieties originating east of Texas. Blackmon of Florida, U.S.A. uses a more definite division into the Large Nut Group, which includes those varieties whose nuts under favourable growing conditions average 60 or less to the pound, and the Small Nut Group, the nuts of which average more than 60 to the pound. However, following the further work of Woodroof and Woodroof of Georgia, U.S.A., on the flowering and fruiting habits of the pecan, the writer favours Stuckey's classification of pecans

according to flowering habits into Group I and Group II, dealt with fully in the book "Pecan Growing," by Stuckey and Kyle and discussed briefly in the following section.

In the accompanying table an endeavour has been made to gather together information available in the Union as to the behaviour of some well-known and other promising varieties which have been tried for a number of years in various parts of the country, full use also having been made of numerous American publications, for which grateful acknowledgment is made. The yield and nut-filling factors vary for the same variety under different growing conditions, and are therefore not included in this general table.

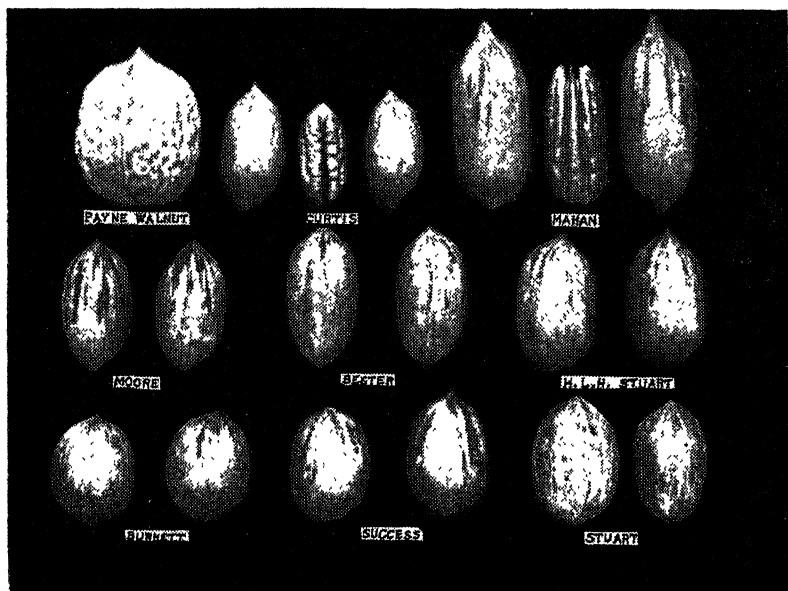


FIG 3.—Nuts of some pecan varieties promising in the Union. Approximate half natural size, the walnut showing the comparison.

According to the performance of trees now in bearing, the indications to date are that the following varieties may be planted with expectation of satisfactory results. *The absence of any variety from the list does not necessarily mean that such a variety is unsuited to the particular area, but that it has not yet been tried there, or that no reports have been received on its performance.*

Eastern Transvaal.—Mahan, Bester Burkett, H. I. H. Stuart (Frotscher), Curtis, Moore Sovereign (Texas Prolific), Gold Mine, Delight.

Natal.—Success, Goliath, Gold Mine, Good Hope.

Swaziland.—Moore, Mahan, Stuart, Success, Moneymaker.

Western Cape Province.—Burkett, Nellis, Nelson, Moore.

Certain South African seedling selections, of which Mr. James, Verulam, Natal, has propagated and distributed the new varieties Gold Mine, Good Hope, Goliath, and Natalia, and of which Messrs.

H. L. Hall & Sons, Mataffin, E. Transvaal, have distributed the new variety Bester and have unnamed others on trial, show distinct promise. The observation of performance in various parts of the country of these selections and other seedling pecans, apart from budded trees or imported varieties, should assist greatly in determining their future commercial value.

Pollination.

The pecan tree is monoecious, which means that the male and female flowers are borne separately on the same tree. The male or staminate flowers are in the form of hanging three-branched catkins, produced in the leaf axils of two-year-old wood, often at the side



FIG. 4.—Flowers of the pecan. Male flowers of Group I varieties on the left, female flowers in the centre, and Group II catkins on the right.

or base of new growth. Pollen carried by wind from these catkins pollinates the pistillate or female flowers borne in clusters of 2 to 8 at the terminals of the current season's growth (Fig. 4). The nuts develop within thick husks which split open when mature.

Kinnison of Arizona, U.S.A., states that with certain varieties, among which are Stuart, Frotscher, Moneymaker, Success and San Saba, the female flowers become receptive to pollen at about the same time as it is shed from the male catkins. Thus, normally, there should be no difficulty with regard to self-pollination and the setting of nuts without the nearby presence of other varieties. With other varieties, among which are Curtis, Delmas, Schley, and Van Deman, the female flowers open and are receptive before the pollen is shed, so that, by the time this happens, the female flowers are dry, and thus are dependent for pollination on other varieties which shed pollen at the time when the female flowers of the former are receptive. Apparently the behaviour of any variety in this respect is not always constant under different climatic conditions.

In Fig. 4 are depicted the staminate flowers at the time of pollen-shedding of the two pecan groups. The catkins of Group I are usually shorter and far more compact in their formation than those of Group II. In addition, in the few varieties studied by the writer, the centre sepal of the calyx of the individual flowers on the catkins in Group II is relatively larger and longer, giving the appearance of a long nail on a slightly bent pointed finger. The scientific worker can now determine by means of microscopic examination of the internal appearance of lateral buds during the dormant season to which group a new or unknown variety belongs.

The practical importance of the subject of pollination lies in endeavouring to ensure that there is always some pollen available in a planting throughout the period that all the female flowers of the trees are receptive. Usually this period extends from mid October to mid November. Although wind is known to carry pollen over distances up to 1,000 yards, any commercial orchard should include at least two varieties of each group; two of these varieties, even if they belong to the same group, may each comprise 45 per cent. of the number of trees, and each of two other varieties 5 per cent. of the total. Full rows of these pollinating varieties may be planted, and for best results the rows should run at right angles to the prevailing spring winds and be on the windward side of the orchard.

Cultural Practices.

It is not proposed to discuss the details of propagation of pecan trees in this article, for this work is highly specialized and the carrying-out thereof is best left to the commercial nurseryman for the present. Suffice it to say that the days of planting seedling pecan trees are past, and only good budded trees obtained from registered nurserymen should be planted. Existing seedling trees should be top-worked to suitable named varieties. Medium-sized well-grown nursery trees, from 3 to 4 feet tall with a 3-year-old root system, have given best results, the small ones tending to remain dwarfed or stunted and the larger ones being difficult to transplant.

Planting.—This should be done early in winter, better subsequent growth during the first season being obtained with trees set out during June-July than during August, for more time is given for root development and consequent better feeding of the top when it comes into leaf.

Because of the large size attained by pecan trees relatively early in their long life, trees in an orchard should not be spaced closer than 50 feet apart, and for some varieties on very fertile soils 75 feet apart would not be too close. In general, 60 ft. by 60 ft. on the square, giving 12 trees to the acre, is recommended as a suitable planting distance. When a grower wishes to obtain a higher yield of nuts per acre in the early bearing years, double planting in the rows can be done, giving 24 trees to the acre with 60 ft. by 30 ft. spacing, *but* it is essential that in from 12 to 14 years when the branches of trees in the row meet, alternate trees be removed, otherwise later the total yield per acre will be less than that which could have been obtained from an initial 60 ft by 60 ft. spacing, for the pecan needs plenty of room, and crowding reduces the yield considerably. During the early years after planting the remaining space in the orchard may be utilized for other crops. Both lemons and naartjes, citrus varieties which come into bearing early, have been interplanted in pecan orchards in the Union, but here again

these trees must be removed before they begin competing with the developing pecan trees, say in about 10 years after planting. The orchard shown in Fig. 2, planted too close at 50 ft. by 50 ft. on the triangle, is interplanted with apples in the row and the space between the rows is used annually for intensive vegetable production.

The procedure and care to be adopted in the actual planting is the same as for planting any orchard in the proper manner. Proper attention should be given to the size of the holes, and notwithstanding the fact that pecan trees are in their dormant stage when planted, every precaution against drying-out should be taken by covering the roots while handling, white-washing or wrapping the stem after planting, and always keeping the soil around the roots in the tree basin moist until good top-growth has been made.

Though no ordinary pruning is practised with the bearing tree, it is considered very desirable that the young tree be shaped. At planting it should be headed back to about 4 ft., and at the end of both the first and second year's growth it should be pruned so as to give a central leader or modified leader pattern, with branches evenly and well spaced around the trunk, without Y-crotches. A tree properly trained when young will give better growth and obviate later losses through branches breaking.

Irrigation.—The importance of water in the production of pecans was stressed when discussing growing requirements. Depending on the moisture-retaining capacity of the soil, if sufficient rain does not fall, the trees should be irrigated every 10 to 14 days during the summer of their first growing season. Older trees would need from three-weekly to monthly irrigations, for best growth and yield will not result if at any time during the growing season the root-zone is deficient in water. Because of the deep-rooting habit of the tree sufficient irrigation water should be applied to obtain deep penetration. (One inch of water usually penetrates one foot with average soils.) On the other hand, with soils which are not well-drained, care must be taken that water-logging does not result, particularly during the dormant season when there is no foliage on the tree to remove water from the soil.

Fertilizers.—While no fertilizer experiments on the pecan have as yet been undertaken in the Union, the tree is known to respond excellently to fertile soils and to applications of kraal manure. In the United States yearly applications of a complete inorganic fertilizer of from 3 to 15 lb. per tree for young trees, and from 20 to 100 lb. per tree for older trees, have brought about marked increases in growth and yields; where possible, three-quarters of the inorganic nitrogen should be replaced with organic nitrogen. Most South African soils have sufficient available potash for best tree growth. Thus, this fertilizing element need not be applied until such time as its need is shown. A general recommendation for a fertilizer programme in the Union could be to apply a form of inorganic nitrogen in July or August, at least two weeks before the bursting of the buds, and liberal amounts of kraal manure either together with or without superphosphate just before the essential covercrop is sown in November or December. On phosphate-poor soils the phosphate will not only induce much better growth of the covercrop but it will also become available to the pecan tree when the covercrop decomposes after it is turned in before the end of summer.

Harvesting and Yields.

When the nuts are fully mature, from April to June depending on variety, their husks split open. Up to 25 per cent. of the nuts will drop from the husks to the ground, but the remainder must be dislodged, either by shaking the branches or by beating the finer growth at the ends of branches with long sticks. Care must be taken not to damage the buds and small twigs which will produce next year's crop. Some growers clear the area beneath the trees of all trash at the beginning of May, and gather the dropped and the shaken-off nuts direct from the ground. With larger trees some prefer, after gathering the fallen nuts, to place a fumigation sail under the tree and then have the remaining nuts shaken or beaten off so that they fall on the sail, thus facilitating gathering and reducing possible losses. The nuts should be dried before marketing, this being best done by spreading them in layers not more than six inches deep on wire-screen trays or racks in a well-ventilated covered place for at least three weeks.

At present very little sorting or grading of nuts before marketing is practised in the Union. However, in the not very distant future it will compensate growers to sort out the poorly-filled nuts from the good ones by means of floating in water, and, after the good nuts have been dried again, these should be graded into sizes and sold accordingly. Strict grading and sizing, plus marketing in varietal groups instead of mixing up, for instance, thick-shelled round nuts with thin-shelled elongated nuts, will do much to place the economics of the future pecan industry in South Africa on a sound footing and ensure the confidence of buyers.

Prospective growers of pecans are naturally interested in the return they may expect from the undertaking. While some varieties will bear a few nuts three or four years after planting, most require from five to seven years before a commercial crop is obtained. Acreage yields for varieties in the Union are not available, but some individual tree maximum yields recorded are:—

Mahan at 5 years on poor soil in E. Tvl., 4lb.; *H. L. H. Stuart* at 6 yrs. on very fertile soil in E. Tvl., 10 lb. (with an average tree yield of 2½ lb. from a 4-acre orchard), other individual trees in mixed plantings giving 65 lb. at 12 years and 204 lb. at 30 years; *Bester* at 9 years on rocky soil in E. Tvl., 35 lb.; *Moore* at 10 years on good soil in Swaziland, 68 lb.; and *Curtis* at 30 years on very fertile soil in E. Tvl., 240 lb.

In Arizona individual trees of the *Success* variety are reported to have yielded 15 lb. of nuts at 5 years, 30 lb. at 7 years, and 110 lb. at 15 years. Top yields are shown by some of the original parent seedling trees from which commercial varieties originated, yields of from 480 to 1,060 lb. of nuts per tree in a given year having been harvested from trees about 100 years old. Kinnison considers that in Arizona, provided the correct varieties are planted on a good soil and given good care, the average yield of a 12-tree-per-acre planting could be expected to average 100 lb. of nuts per acre at 6 years, 500 lb. at 10 years, and 1,000 lb. at 15 years after planting. Allowance must be made for those years in which unfavourable climatic conditions result in an almost complete failure of certain varieties.

Growers are to-day receiving from 3s. to 3s. 6d. per lb. for nuts. As more trees come into production a drop in price is probable, but even at half the price mentioned, with trees producing a normal

yield, the return to the grower will be remunerative. However, consumer demand may be expected to increase as the nut becomes popularized. Top prices in the U.S.A. with their far greater production costs have been just under 2s. per lb., and in 1945 a return of about 1s. 3d. per lb. for nuts of improved varieties and less than 6d. for seedlings or wild nuts was considered profitable. Top prices will always be paid for quality nuts, and the confectionery trade in the Union can absorb a very large quantity of small nuts for cracking to replace some of the many tens of thousands of pounds worth of nuts of all kinds which before the war were imported from overseas.

Diseases and Pests.

The economic importance of diseases and pests to the pecan in South Africa is as yet difficult to estimate. A formidable array of these is reported in certain pecan-growing areas in the United States, but at the same time plantings of proven varieties in newer areas do not appear as yet to be affected to the same extent.

In South Africa crown gall is a very important economic disease, particularly with newly-planted deciduous fruit trees. Since the pecan is susceptible, growers should take the greatest care that the trees are free of the typical galls on the roots at the time of arrival from the nursery. No reputable nurseryman should have crown gall in his nursery, but unfortunately, when there is a shortage in the supply of trees, growers often purchase from any available source and suffer serious losses at a later stage.

The all-important fungus disease, pecan scab, which affects the leaves and young fruits, can be obviated to a large extent by planting resistant varieties in humid areas where the disease is likely to cause appreciable losses. Frequent October-November rains or mists accompanied by low daily percentages of possible sunshine bring about a heavy infection on susceptible varieties. Orchard sanitation, in addition to spraying with Bordeaux mixture or lime-sulphur solution at least three times at intervals of about three weeks after the leaves have developed, is recommended for control. Dusting with four to six applications of a 20-80 mixture of monohydrated copper sulphur and lime dust has also given satisfactory control.

A well-known physiological disease is pecan rosette, an affected tree producing unsatisfactory misshapen growth, dwarfed mottled crinkled leaves, and very few nuts. This condition has been found to be cured by the application of zinc salts to the tree, being caused by a deficiency in zinc absorption by the roots from soils which are deficient in available zinc.

Among the insect pests a brown night-flying beetle has caused much damage in the eastern Transvaal by eating portions from the flowers, young nuts, and foliage. The beetle operates at night, and some success in its control has been obtained by placing trap-lights over basins of water covered with a film of paraffin. Poison spray and dusting experiments are to be undertaken.

Young plantings of pecans have been found severely infested with two types of borer, one originating from a moth and the other from a beetle. The workings of these borers are seen externally on the bark of the trunk and main limbs as brown saw-dust castings held together loosely by interwoven silk threads. Regular inspections of the trees, especially during the dormant season, will easily lead to the detection of such workings. Control may be effected by

SOME PECAN VARIETIES IN SOUTH AFRICA.
Tentative Observations on Performance.

Variety.	Group.	Tree Form.	Time of Blossoming.	Time of Maturing.	Scab Susceptibility.	Shell Thickness.	Nut Size.
Gold Mine.....	I.....	Open, spreading.....	Medium-late..	Late.....	Slight.....	Thin.....	Large.
Good Hope.....	I.....	Vigorous, spreading.....	Medium.....	Medium.....	Slight.....	Medium.....	Medium.
Moore.....	I.....	Medium, willowy.....	Early.....	Very early..	Slight.....	Medium.....	Small.
Nelson.....	I.....	—	Early.....	Late.....	Very slight..	Very thick...	Large.
Pabst.....	I.....	Rank, med.-upright.....	Medium-late..	—	Slight.....	Medium.....	Medium.
Sovereign (Texas Prolific).....	I.....	Open, upright.....	Medium.....	Early.....	Slight.....	Thin.....	Small.
Squirrels Delight (Delight).....	I.....	Vigorous, upright.....	Early.....	Early.....	Very Slight..	Medium-thin.	Large.
Success (1).....	I.....	Vigorous, funnel-shaped.....	Medium.....	Very early..	Slight.....	Medium-thin.	Medium.
Bester.....	II.....	Medium, upright.....	Early.....	Early.....	—	Thick.....	Medium.
Burkett (2).....	II.....	Vigorous, open spreading.....	Early.....	Early.....	Slight.....	Thin.....	Small.
Curtis.....	II.....	Dwarf, spreading.....	—	Early.....	Very slight..	Medium.....	Very large.
Delmas.....	II.....	Vigorous, symmetrical.....	—	Late.....	Very great..	Medium.....	Large.
Goliath.....	II.....	Vigorous, upright.....	Late.....	Late.....	Very slight..	Thin.....	Large.
H.L.H. Stuart (Frotscher).....	II.....	Rank, open spreading.....	Late.....	Late.....	Very slight..	Thin.....	Large.
Mahan (3).....	II.....	Vigorous, med.-upright.....	Early.....	Early.....	Very slight..	Medium-thick	Medium.
Money-maker.....	II.....	Vigorous, spreading.....	Early.....	Early.....	Great.....	Medium-thin.	Medium.
Natalia.....	II.....	Vigorous, med.-upright.....	Early.....	Early.....	Great.....	Very thin....	Large.
Schley (4).....	II.....	Vigorous, round upright.....	Medium.....	—	Very slight..	Medium-thick	Large.
Stuart.....	II.....	Medium close upright.....	Very late....	Very late....	Great.....	Medium-thick	Large.
Van Deman.....	II.....	Medium, funnel-shaped.....	Medium.....	—	Great.....	Medium-thick	Large.

(1) Recommended as best for the colder northern portions of California.

(2) This was the most favoured variety for planting in Arizona in 1932, where it is stated to have a thin shell.

(3) Best variety for planting in hot southern portions of California.

(4) The highest quality pecan known, but very susceptible to scab.

killing the larvae in the burrows with a bent piece of wire, injecting raw linseed oil into the burrows by means of an ordinary oil can, and by painting the damaged surface of the wounded bark with a stiff mixture of Bordeaux powder and raw linseed oil. *Boiled linseed oil or any other oil should not be used.*

In certain parts of the Union white ants (termites) have done much damage to young newly-planted trees. Control of these may be effected if regular inspections of the basins are made, and if, at the first signs of workings, the basin area some 3 feet in radius round the trunk be watered with 4 to 5 gallons of a solution of 1 lb. of copper sulphate dissolved in 20 gallons of water.

Acknowledgements.—The writer wishes to acknowledge with thanks the assistance received in this work from those who have had many years of practical experience in pecan growing, in particular Messrs. H. L. Hall & Sons, who, through their Orchard Manager, Mr. C. E. P. Hayes, placed records and information at the writer's disposal.

Levelling Outfits for Farmers.

In order that farmers may help themselves in the surveying of anti-erosion works, the Director of Soil Conservation and Extension has made arrangements for the local manufacture and sale of reliable, but cheap instruments. The outfit consists of a telescopic dumpy level with tripod, levelling staff and instructions. It will be obtainable from the Division of Soil Conservation and Extension, P.O. Box 965, Pretoria, against a remittance of £10, accompanied by a certificate from the local Magistrate or Extension Officer, indicating that the applicant is a *bona fide* farmer.

Nursery Quarantines.

The following nursery quarantines were in force on 1 September 1946:—

- (1) Howden's, Westville, Durban, on *Eugenia*s (all), for circular purple scale.
- (2) Clark's Nursery, Pretoria, on fruit trees, shrubs and palms (part), for pernicious, red, circular purple and rosc scales.

Controlling the Maize Stalk-Borer with D.D.T.

E. E. Anderssen, Entomologist, Pretoria.

It is most essential that the ravages of the maize stalk-borer should be checked this coming season. In some mealie lands the borer last year destroyed 90 per cent. of the crop and in others the crop was so damaged that it was not worth reaping at all, so that farmers simply turned their cattle on to it and used it for grazing. Under the present circumstances and in view of the world shortage of food, such losses cannot be tolerated.

For this reason, therefore, the officers of the Division of Entomology carried out extensive tests last season with 5 per cent. D.D.T. talc powder used as a top-dressing against the stalk-borer larvae. These tests were first conducted in the laboratory and later in the field, and gave excellent results. Based on these results, the following recommendations are given, so that the maize stalk-borer may be kept in check this season.

All stages of the larvae were found to be susceptible to the powder where applications had been applied and timed correctly. Weaker mixtures of the powder, down to 1½ per cent. D.D.T., were also found effective, but until further notice, the 5 per cent. is recommended.

Secret of Success.

Timing the applications and dosing correctly is the secret of success and particular stress is thus laid on these two points. Only plants in the funnel stage of growth are suitable for treatment, but all plants in that stage, irrespective of height, can be treated.

It must be remembered that the top-dressing treatment is only effective for checking the infestation that occurs through the funnel or top of the plants and not that which occurs through the side of the stalk. Early in the season almost all infestation takes place through the top.

The amount of dust required per plant depends on the size, but it is safe to say that the minimum amount than can be applied in practice is all that is needed. Most of the dust falls into the funnel, but a little spills over the side and this slight overflow of dust on to the outer leaves around the funnel is an advantage.

The amount of dust per morgen of plants need not exceed 15 lb. for best results, but, apart from the extra cost of the material, there is no harm in applying somewhat larger quantities.

One labourer can treat three morgen and more of mealies per day, and the only equipment required is a fairly large container slung over the shoulder for holding the dust, and a scoop with a handle for applying it.

The most suitable scoop to use is the type with upright sides, cylindrical, and 1½ to 2 inches in diameter, like a small milk tin. The depth is optional, but approximately 2½ inches is sufficient. Such a scoop holds enough powder for a number of plants to be treated in succession as the operator moves from one plant to another down the row. Many other types of applicators were tested, including spoons and complicated machines. The spoon type of scoop was quite unsuitable, while the more expensive applicators had a number of disadvantages, not least of which was the labour involved in using them. The scoop method is so simple that farmers will easily be able to devise something inexpensive and suitable from materials available on the farm.

When to Apply D.D.T.

It is accepted that the funnel stage of growth of the mealie plant is the only suitable stage for making the application, and now it has to be decided when, during the funnel stage, the top-dressing should commence.

There are a number of considerations and observance of these is extremely important if the maximum benefit is to be gained from the treatment. D.D.T. affords protection to plants against larvae entering *via* the funnel, and the longer the period of protection can be extended, the better. The original infestation caused by moths emerging in early spring shows up at random in the field in the shape of intense "speckled" leaf symptoms, with plants having a yellow appearance and being severely stunted. The "speckled" appearance is the result of larval feeding. From these stunted plants young larvae migrate to new plants in the vicinity to enter *via* the funnels of these other plants. Plants which become infested through migration described above show fewer speckles, are not stunted in growth, and retain the healthy green foliage. If this migration is allowed to proceed for a week or ten days and the 5 per cent. D.D.T. powder applied only then to every plant present, the period of protection will be extended to its maximum.

This procedure of delaying treatment until the first migration of the larvae has occurred, is called a "delayed action" policy, but it must only be carried out if the grower is prepared to make regular and careful observations in his mealie lands, for otherwise he may wait too long before applying the dust and serious losses may result. The object of this "delayed action" method is, therefore, to extend the period of protection as long as possible. The D.D.T. has itself a residual action of from two to three weeks and this, added to the period of delay, gives a total period of about five weeks during which the insect is prevented from doing serious damage and from developing a second generation of moths.

It should be remembered that when once larvae have entered the plant other than *via* the funnel, then no amount of D.D.T. treatment to the funnel will be of any use. The great importance of making applications during the funnel stage of growth is thus clear. The D.D.T. treatment remains effective for a considerable time until the powder has moved to the outside of the growing foliage.

Rain on D.D.T.-treated plants has a tendency to wash the powder back into the throats of the plants, and, unless rains are torrential, a reasonable amount of free moisture on the plants improves rather than reduces the efficacy of the treatment.

Extensive feeding tests and chemical analyses have shown that D.D.T. on maize, when used as advocated above, does not constitute a danger to stock. No harmful effects on the plants were apparent nor was plant pollination upset in any noticeable manner.

Infestation of treated lands which were made perfectly free from borers and which have advanced beyond the funnel stage to form cobs, may occur from neighbouring lands where no treatment was applied. Such infestation in cobs and stalks is beyond treatment by top-dressing and the only way to prevent this is to co-operate and get your neighbour to treat his maize lands too. Growers should come together and make it their business to see that all maize is treated. It is only in this way that the maize stalk-borer can be kept down.

Handle D.D.T. like any other poison.

Selection of Poultry for Egg Production.

A. M. Gericke, Department of Poultry Husbandry, Agricultural Research Institute, Pretoria.

A HIGH average egg production in the flock is an essential for a reasonable income on a poultry farm. Low egg producers and non-producers, commonly referred to as "culls", are not profitable and their presence in a flock is detrimental for the following reasons:—

1. If culls are retained the average egg production of the flock is reduced and less space is available for the best egg producers.
2. Culls are poor egg producers because they cannot respond to optimum conditions of feeding and management.
3. Culls may be carriers of disease and intestinal parasites and may play an important rôle in the transmission of disease and intestinal parasites to healthy individuals. By consuming insufficient food for maintenance they very often starve themselves into a pitiful condition with the result that their carcasses become unfit for table purposes.

Recognizing Poor Producers.

Several methods of selection are known by which poor egg producers can be recognized and eliminated from the flock:—

(1) *Body conformation*.—In a poor egg producer the beak is weak and inclined to be narrow and straight. The head is narrow, the eyes may be sunken in the head, the back may be round, and a general lack of body capacity is shown.

A good egg producer has a strong beak, a deep and broad head with prominent eyes, a broad and full chest, a broad flat back, a long keel and a good capacity between the end of the breast bone and the pelvic bones.

(2) *Pigmentation test*.—By this test the best egg producers can be separated from the poor egg producers with a reasonable degree of accuracy. The test can be applied to yellow-skinned breeds such as the White Leghorn, Wyandotte, Plymouth Rock and Rhode Island Red. Until the time when she lays her first egg, that is, when she is sexually mature, a yellow-skinned pullet in good condition exhibits a prominent yellow colour in various parts of the body. Feeding green feed and yellow mealies will intensify the yellow colour in the body and shanks as both products are good sources of xanthophyll or the yellow colouring pigment.

When a pullet commences laying, the yellow pigment is no longer stored in the body but is transferred to the ovary for the formation of the egg yolk and various parts of the body become bleached as the result of an oxidation process and the reabsorption of pigment by the blood stream. The bleaching occurs in a definite order, that is, anus, eyelids, earlobes, beak and shanks. For selection, the bleaching of the anus, beak and shanks are of the most practical value. The complete bleaching of the anus indicates that a hen has laid from 3 to 8 eggs; the total bleaching of the beak shows a production of approximately 15 to 30 eggs; and the loss of colour in the shanks indicates a production period of approximately 4 to 6 months or longer. Bleaching of the shanks can therefore be used for estimating egg production over a long period (persistency of laying).

When a bird stops laying, the yellow colour reappears in the different parts of the body in the same order as the bleaching occurred, but the yellow colour reappears more rapidly. Hens exhibiting a yellow colour in the shanks during the spring and summer months (September to December) are usually poor egg producers and these should be culled. If hens do not lay at a high rate in the spring or normal productive period, it is obvious that their annual egg production will be low.

(3) *Moulting*.—It is well known that hens shed their old feathers and grow new feathers each year. This is a physiological process defined as moulting. The shedding of the old feathers occurs in a definite order, viz. neck, back, breast, fluff, tail and wings. For estimating annual egg production the moulting of the primary feathers, usually 10 in number, growing at the outside edge of the wings, is of great importance. The long wing feathers of flights are divided into two sections, namely, the primary and secondary feathers, and these are separated by the axial feather or small wing feather. In a slow or regular moult, 6 weeks are allowed for the primary feather next to the axial feather to grow to maturity, and 2 weeks for each additional mature feather. With 10 primary feathers in the wing it would take a slow moulter 24 weeks to grow her new feathers. In a rapid moulter the shedding of the feathers is irregular, that is, the primary feathers are not shed one at a time as in the slow moult, but 2, 3, 4 and 5 feathers are lost simultaneously. Hence the rapid moulter sheds her old feathers much more rapidly than the slow moulter and her non-productive period is usually much shorter than that of the slow moulter. Low egg producers and high egg producers require approximately the same time to grow their new feathers, but high producers shed their old feathers much more rapidly than low producers.

For selection it is important that the different groups of moulters should be recognised:—

(a) *False or partial moult*.—A partial moult frequently occurs in pullets during April, May and June, when they shed only the neck feathers. Early hatched and sometimes late hatched pullets may go into a partial moult as a result of unfavourable environmental influences such as a reduction in the daily light period during the autumn, low winter temperatures, sudden changes in the ration, transfer from one run to another, colds, chicken-pox and various other abnormalities. The partial moult in pullets normally occurs when second-year hens are in a complete moult, and hence egg production is low in the late autumn and early winter months. As the date of hatching and number of days to sexual maturity have such an important influence on a partial moult and the cessation of egg production, hatching dates should be regulated to fall within the period July to September each year.

(b) *Late moulters* (March and April) are better egg producers than early moulters (November, December and January).

(c) *Hens laying and moulting at the same time* are excellent egg producers. They usually moult slowly, but are exceptional cases. Hens which stop laying and moult slowly are low egg producers, whereas those which moult quickly are good egg producers.

The moulting test can be applied to all breeds and varieties of fowls, whereas the pigmentation test can be applied only to yellow-skinned breeds and varieties. These tests can be applied successfully at the end of the first year of egg production, that is, in March and April. At this time of the year the hens may be divided into three groups, namely, (1) breeding hens, (2) hens which can be kept for another year, and (3) culls.

(4) *Single-pen testing and trapnesting.*—To ensure actual egg records of individual birds, pullets are often placed in single pens, or trapnests are installed in laying houses. By these systems of testing for egg production, details can be obtained of the distribution and rate of egg production during different periods of the laying year. Before hens are tested, they are sexually selected for breed characteristics and vigour. Owing to the expense involved in constructing single pens or trapnests, it does not pay the poultry breeder to test hens which have disqualifying characteristics. In single pens of approximately 3 feet by 6 feet one light and one heavy breed pullet can be placed. The eggs are easily recognized by the colour of the egg shell. Light breeds with white earlobes lay white-shelled eggs, and heavy breeds with red earlobes lay brown or tinted-shelled eggs. The eggs of each bird are recorded daily.

(5) *Short periods of egg production as criteria for predicting annual egg production.*

Owing to the labour involved, trapnesting is not a popular system of testing on the average poultry farm, but it is of importance for the breeding of high-producing egg strains and strains with resistance to disease, large egg size and lack of broodiness.

Trapnesting for short periods has long been recognized as an important measure in estimating annual egg production. If trapnesting is conducted during a four-monthly winter period and during the last month of the autumn period, the poultry breeder has a reliable system of selecting the best egg producers for breeding purposes. This short period of testing is of value due to the fact that there is an important relationship between winter and annual egg production. It has been found that the highest winter producers are also the highest annual producers. Egg production during the spring period is not nearly as accurate a basis for predicting annual production as is winter production. In the spring period even low egg producers may lay at a remarkable rate, but during the winter and autumn periods they are much less consistent in egg production than high egg producers.

By this system of selection egg size need not to be sacrificed. Pullets which lay small eggs three months after the date of the first egg should not be selected for breeding purposes even if they lay 200 or more eggs in the first year. Hens which go broody, should be marked with a distinctive band so that they can be recognized when birds are selected for breeding purposes. In light breeds, broodiness is a serious defect, and broody hens should be culled, whereas in heavy breeds one broody period per hen per year can be allowed. The majority of breeders cull such birds, but it has been established that broody birds lay at a higher rate in the winter than non-broody hens. Therefore it would perhaps be advisable to cull only hens which exhibit two or more broody

periods per year. The criterion for culling broody hens will depend largely upon the number of non-productive days occurring during each broody period and the number of eggs laid in the winter.

(6) *Progeny testing*.—This test refers to the estimation of an individual's value as a breeder by means of the performance of its progeny. Progeny testing can be determined by trapnesting or single-pen testing of the daughters. If trapnests and single pens are not available, a reliable estimate can be obtained of the breeding worth of each sire by placing his daughters in a separate house and recording their daily average production. For a comparative test of various sires this method is of definite value.

No matter which method of testing is adopted, it is important that the daughters should be a representative sample of the mating. With 6 daughters per dam a highly reliable estimate can be obtained of the dam's transmitting ability. With 6 daughters per dam bred from a minimum of 4 dams a reliable estimate can be obtained of the transmitting ability of a sire.

Unfortunately the progeny test cannot always be determined accurately because dams do not produce the same number of vigorous pullets, and the poultry breeder has to be satisfied with a comparison of egg records from unequal numbers of daughters. Owing to such limiting factors as differences in fertility and hatchability of eggs and rearability of chicks, the breeder must sometimes compare dams represented by the egg records of 1, 2 and 3 daughters per dam. Owing to the fact that egg production is determined by hereditary factors as well as environmental influences, it is clear that the transmitting ability of the parents can be calculated with greater accuracy when a large, rather than a small number of daughters are tested.

The egg records of the sisters of a sire and dam are also of definite value in breeding for a high average egg production. According to Godfrey (1946) the egg-production records of all of a cockerel's full sisters and half sisters with a minimum of 20 give a significant measure to use in predicting his daughters' performance. This method is most useful for selecting hens as breeders, but in the selection of breeding cockerels their sisters' egg records have not been completed by the time the cockerels are to be mated. The cockerels must therefore be selected on an incomplete family record, or they must be kept until the second year before being mated. It may further be noted that second-year birds are most valuable for breeding a strain resistant to disease, because birds of this age have given proof of livability.

In Table I the egg records are given of surviving sisters in the first laying year.

From Table I it will be seen that the birds in Group A are definitely superior to those in group B for breeding purposes. It is also fairly obvious that the individual egg record of a bird may be altogether misleading if the family records are not available. If 7 or 8 daughters are bred by a dam and only 3 or 4 are trapnested for 1 year, the breeder may have completely unreliable information on the breeding value of the dam and, furthermore, it will not be possible to evaluate correctly either the daughters or the sons.

SELECTION OF POULTRY FOR EGG PRODUCTION.

TABLE I.—*Egg records of full sisters.*

Group.	No. of sisters tested.	Production of highest producer.	Number culled.	No. which died.	Number which survived.	Average production of survivors.
A....	8	260	—	—	8	228
	7	218	1	—	6	204
	8	212	—	1	7	190
B....	8	231	3	1	4	110
	7	206	1	2	4	134
	7	229	—	3	4	161

Mueller and Hutt (1946) showed that a little over 30 daughters were adequate for testing the viability of a sire's progeny when the mortality in the population ranged from 37 to 53 per cent. With a lower mortality a greater number of daughters is necessary for the differentiation of sires. The same workers indicated that the number of daughters needed for tests of egg production is much smaller than that required for tests of viability. Six daughters with completed records appear to be adequate for tests of dams for ability to transmit egg production.

In Michigan farm flocks it was found that flocks having the highest mortality among growing chicks to 24 weeks of age are also inclined to have the highest laying-flock mortality. In Table II the data of K. T. Wright, Michigan Experiment Station (1938), also quoted by Jull (1943), are given:—

TABLE II.—*Mortality in chicks and hens.*

Percentage chick mortality to 24 weeks.	Percentage mortality in laying flock.
7.0	7.3
14.0	15.2
27.7	28.2

These results clearly demonstrate that chick mortality should be kept as low as possible. Pullets in the first laying year very often die before they have actually paid for feed costs and other expenses incurred during the rearing and growing periods. In the Union large numbers of chicks die each year. With good management mortality can be considerably reduced because far too many chicks die as a result of overheating and chilling.

Results of Study at A.R.I., Pretoria.

At the Agricultural Research Institute a study was made of the influence of mortality and culling on the distribution of egg production in the first laying year. In this investigation the egg records of 3,942 White Leghorn and 926 Australorp hens were analysed. The monthly distribution of egg production in White Leghorns and Australorps is given in Table III. From the table it will be seen that the birds were divided into 4 groups.

- (A) Egg production of all hens trapnested.
- (B) Egg production of all hens minus the number of eggs laid by hens until the time of their death.
- (C) Egg production of all hens minus the egg production of culls until the time of their removal from the flock.
- (D) Egg production of all hens minus the production of hens which died and those which were culled.

It should be explained that the culls were removed from the flock at regular intervals, and they can be grouped as (a) hens which never laid eggs, and (b) poor egg producers. It is accepted that, if the culls had not been removed, a large number would have died at a later date because they are generally less resistant to disease than average and high egg producers.

Hens lay a certain number of eggs until the time that they become sick and die. The number of eggs will depend upon how soon they die after they have been placed in the laying house. In the case of an infectious disease the hens may die in large numbers within a few days, a week or month. In this study the birds died sporadically during different periods of the year. These figures should therefore supply useful information on the monthly distribution of eggs in an uncultured and a culled flock.

In Table IV a summary is given of the egg production of the 4 groups of hens mentioned above, and of the average increase in the number of eggs laid if culls and those which died are eliminated from consideration at the commencement of the production year. Unfortunately is cannot be determined in advance which birds will be culls and which birds will die. Therefore sound breeding, feeding and management are so essential in order to keep the percentage mortality and culls at a low level.

From Table IV it will be seen that the average mortality was 12.5 per cent. in Australorps and 14.8 per cent. in White Leghorns. The average reduction in the flocks due to mortality and culling varied from 37.7 per cent. in White Leghorns to 34.3 per cent. in Australorps, and the average increase in production in the remaining birds represented from 42.6 to 37.6 eggs per bird respectively.

In Figures 1 and 2 a graphical distribution is given of the percentage monthly egg production of the 4 groups of birds in each breed. The diagrams show that the percentage monthly production increased from April to August in Australorps and from April to September in White Leghorns, and that it was followed by a decrease until the production at the end of the laying year was lower than at the beginning of the year.

The percentage egg production will vary in different flocks due to such factors as breeding, housing, feeding, management and date of hatching. Early-hatched pullets (April and May) usually moult in the winter period, and their rate of egg production at the commencement of the laying year will probably be lower than that of the flocks studied at the Experimental Farm, where pullets are usually hatched in July, August and September. In a recent investigation, the results showed fairly definitely that, for reliable progeny tests, hatching dates should be regulated so as to fall in two successive months of the above period of three months. For the raising of stud cockerels early hatching is of definite value as these birds will be mature when required for mating.

If mortality is reduced and culls are eliminated at regular intervals, the feed costs for the production of eggs will be lower and more economical. The shortage, and high cost, of poultry feed

SELECTION OF POULTRY FOR EGG PRODUCTION.

are important reasons why culls should be eliminated regularly, and poultry farmers must acquaint themselves with the best methods of selection so that this knowledge can be applied.

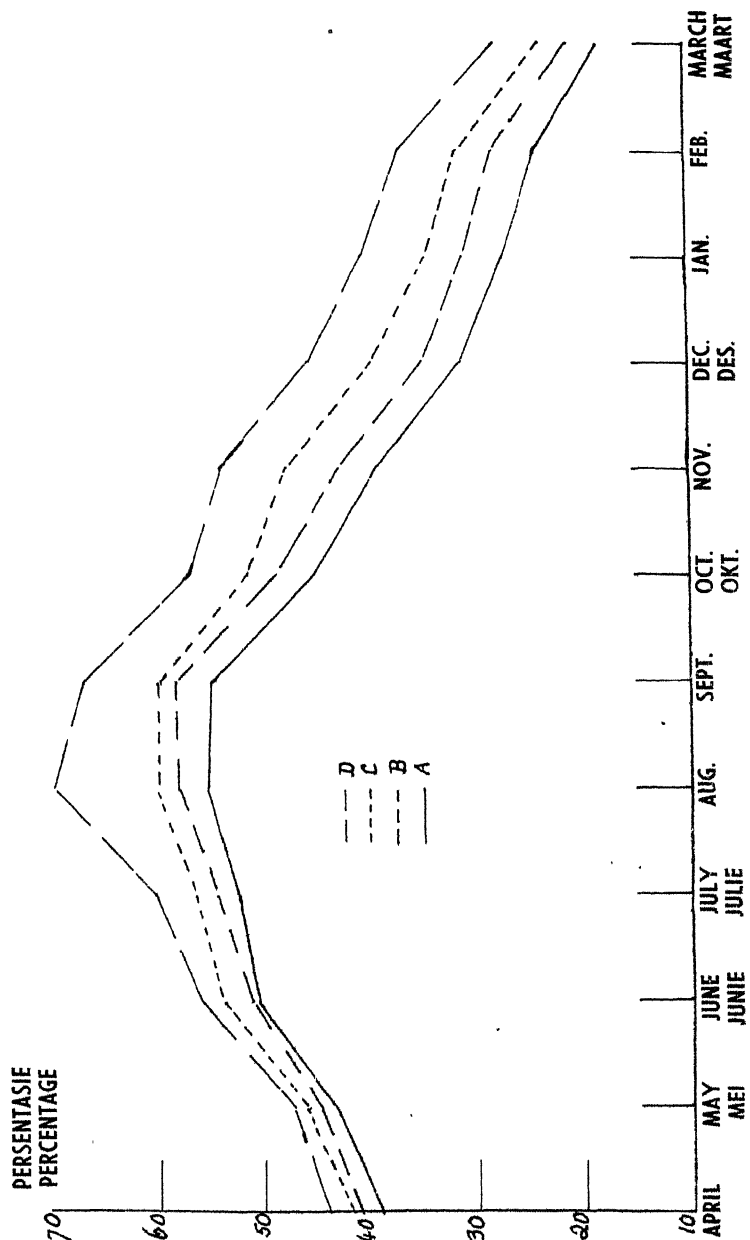


FIG. 1.—Percentage monthly egg production—Australorps.

Eggs are rich in vitamin A and riboflavin (the latter is growth-promoting vitamin), and hence eggs are classified as a protective food. Eggs are also a good source of vitamin D, iron and proteins, and therefore the economical production of such a valuable food must be encouraged and maintained in any progressive country. In the United States of America it is estimated that the per capita consumption is at present 400 eggs per annum as compared with 290 in pre-war days.

For the future welfare of the poultry industry, only reliable egg producers should be kept. Eggs of high quality must be produced and marketed and the excessive production of day-old chicks from immature and weak flocks should be eliminated.

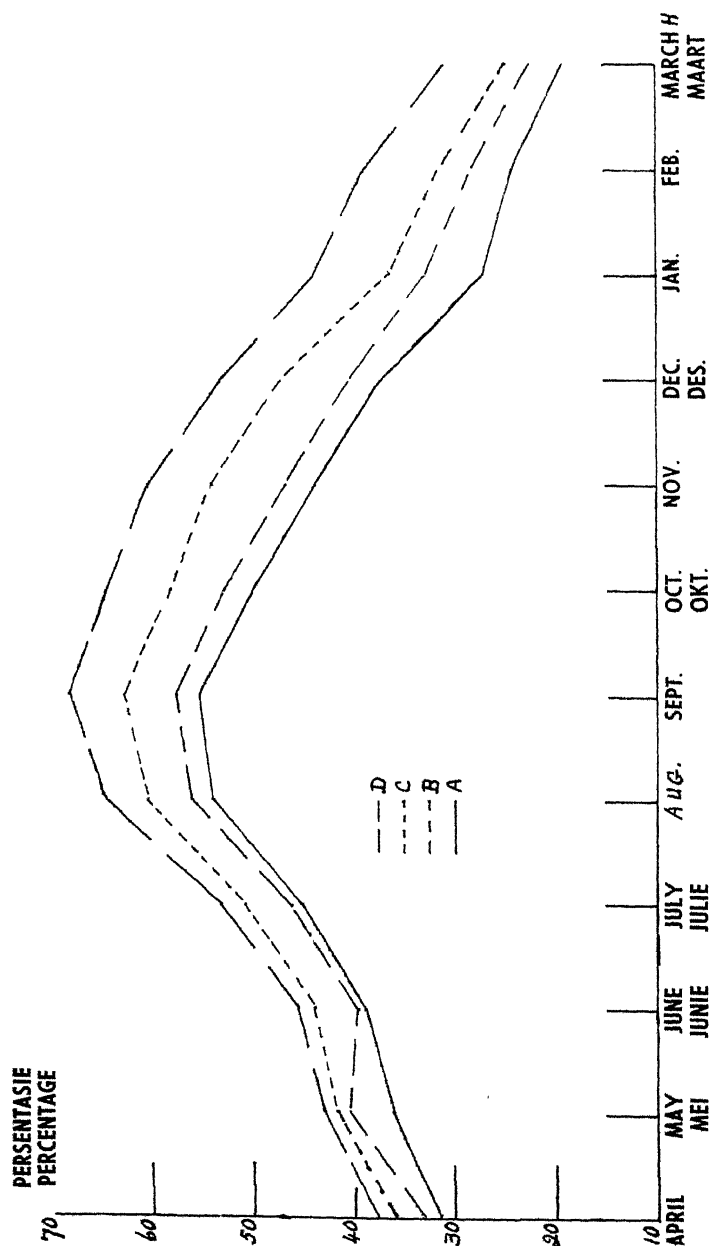


FIG. 2.—Percentage monthly egg production.—White Leghorns.

TABLE III.—Average monthly egg production in Australorps and White Leghorns.

Group.	Breed.	No. of birds.	April.	May.	June.	July.	August.	Septem-ber.	Octo-ber.	Novem-ber.	Decem-ber.	Janu-ary.	Febru-ary.	March.	TOTAL.
A.....	Australorp.....	926	11.8	13.5	15.2	16.4	17.2	16.5	14.1	11.9	9.8	8.5	6.9	5.7	147.5
B.....	"	810	12.3	13.7	15.5	17.0	18.1	17.6	15.1	12.9	10.8	9.6	7.9	6.5	157.0
C.....	"	724	12.5	14.2	16.2	17.6	18.6	18.6	16.0	14.4	12.4	10.8	8.8	7.3	167.4
D.....	"	608	13.2	14.7	16.8	18.7	21.7	20.2	17.7	16.2	14.2	12.6	10.4	8.7	185.1
A.....	White Leghorn.	3942	9.5	11.2	11.7	14.0	16.7	16.5	15.4	13.1	11.5	8.8	6.8	5.9	141.1
B.....	"	3359	10.0	12.5	11.8	14.3	17.4	17.3	16.3	14.0	12.4	10.1	8.0	6.9	151.0
C.....	"	3038	10.8	12.9	13.2	15.7	18.7	18.8	18.0	16.1	14.5	11.2	8.8	7.7	166.4
D.....	"	2455	11.3	13.3	13.7	16.5	20.1	20.5	20.0	18.0	16.4	13.6	10.8	9.5	183.7

TABLE IV.—Influence of mortality and culls on the average egg production.

Breed.	GROUP A.			GROUP B.			GROUP C.			GROUP D.		
	Mean egg production.	Percentage mortality.	Increase in production.	Mean egg production.	Percentage culls.	Increase in production.	Mean egg production.	Percentage culls.	Increase in eggs.	Percentage culls and mortality.	Mean egg production.	Increase in eggs.
Australorp.....	147.5	12.5	9.5	157.0	21.8	9.5	167.4	21.8	10.9	34.3	185.1	37.6
White Leghorn.....	141.1	14.8	9.9	151.0	22.9	9.9	166.4	22.9	25.3	37.7	183.7	42.6

REFERENCES.

- GODFREY, A. B. 1946: Value of the sisters' performance in selecting breeding cockerels. Poultry Sci. 25:2:148-156.
 MUELLER, C. D. AND F. B. HUNT 1946: The number of daughters necessary for progeny tests in the fowl. Poultry Sci. 25:3:246-255.
 JULL, M. A. 1943: Rearing chickens for meat and egg production. University of Maryland Bull. 100.1-52.

The Cost of Egg Production, 1944/45.

A. R. Havemann, Division of Economics and Markets.*

During 1945 an investigation into the production costs of eggs was carried out by the Division of Economics and Markets. The findings are given below.

The investigation was limited to specialized poultry farms around Cape Town in the western Cape Province, around the Rand and Pretoria in the Transvaal and mainly around Pietermaritzburg and near Port Shepstone in Natal.

Of the total of 140 poultry farmers visited, 73 were in a position to supply data which could be used for the calculation of costs.. The remainder could not furnish the more important data or accurate figures. Only a few farmers could furnish accurate data in connection with the number of laying hens throughout the year; consequently no calculations per hen could be made in the investigation. For this reason the costs were calculated per dozen eggs produced.

The year during which the investigation was made, was more or less representative of a normal egg-production season, and covers the period January to December 1944 in the western Cape Province and March 1944 to February 1945 in the Transvaal and Natal.

TABLE I.—*Capital investment in specialized poultry farming: 1944/45; average per unit.*

Item.	W.P.	Rand.	Natal.	Three areas together.
Land for fowls.—				
Morgen.....	12.7	1.3	1.7	5.3
Value.....	£887.5	£367.8	£131.9	£484.0
Percentage of total.....	11.2	8.6	6.6	9.8
Buildings, runs and water supply for fowls.....	£3,305.3	£1,930.9	£791.7	£2,136.3
Percentage of total.....	42.7	45.3	39.5	43.3
Total fixed capital for fowls....	£4,172.8	£2,298.7	£923.6	£2,620.3
Percentage of total.....	53.9	53.9	46.1	53.1
Movable equipment for fowls....	£737.9	£476.9	£330.2	£537.6
Percentage of total.....	9.5	11.2	16.5	10.9
Fowls.....	£2,834.5	£1,489.4	£749.1	£1,777.6
Percentage of total.....	36.6	34.9	37.4	36.0
GRAND TOTAL.....	£7,745.2	£4,265.0	£2,002.9	£4,935.5
Percentage of total.....	100	100	100	100

* The following members of the Division of Economics and Markets assisted in the field work in connection with the investigation: Messrs. G. J. C. Uys, G. J. Uys, N. A. B. Bestbier, A. B. C. Nel and J. le R. Retief.

Although the sale of fresh eggs constitutes a very important source of income for all poultry farmers concerned in this investigation, not all the farming concerns were operated with a view mainly to egg-production.. In 40 out of a total of 73 cases, the main object was egg-production, while the remaining 33 concerns were concentrated on the production of day-old chicks and, occasionally, breeding birds, in addition to egg-production. Separate calculations of costs were therefore made for farmers who sold no day-old chicks, and for those who did.

Capital Investment.

In Table I, the average capital investment is given per poultry farm for each of the areas, and for the three areas taken together.

From Table I it appears that a little more than half of the total capital was invested in land and permanent improvements, the greater part of which comprised buildings, runs and water supply. Approximately 80 per cent. of the total capital was invested in permanent improvements and fowls and 20 per cent. in land and movable equipment.

Cost of Egg-Production and Discussion of Cost Items.—Table II indicates the gross cost of egg-production for all the poultry farms, including those selling day-old chicks. These figures refer only to the cost of producing eggs, irrespective of what happens to them after production, i.e. whether they are sold as fresh eggs or hatching eggs, or whether they go to the incubator for the production of day-old chicks. These costs were calculated by charging against the total egg-production all costs incurred by the enterprise, with the exception of costs incidental to the production of day-old chicks for sale (such as hatching and marketing costs). The production of day-old chicks was therefore regarded as a separate branch of poultry farming.

Permanent Improvements in connection with egg-production include the following: fowl runs built of brick, galvanized iron, sacking or any other material, movable houses, wire fences, store rooms, feed rooms, water supply units, and all nests, hoppers, heating apparatus, etc., attached to buildings.

In the case of improvements such as store-rooms, water supply units, etc., which are not exclusively used by fowls, an allocated value was charged against the poultry farming enterprise. Similarly the capital invested in incubators and incubator rooms, and charged against egg-production, is in proportion to the number of day-old chicks kept by the farmer for supplementing his own flocks.

Wherever possible, the cost of erecting the fixed improvements was obtained and, after allowing for wear and tear, taken as the value of the investment. Where erection costs could not be obtained, a conservative valuation was made.

TABLE II.—*Gross Cost of Egg-production in Pence per Dozen, and Percentages of Total, 1944/45.*

Item.	W.P.	Rand.	Natal.	Three areas together.	W.P.	Rand.	Natal.	Three areas together.
Number of cases.....	25	31	17	73	34.2	42.5	23.3	100
	875,685	450,659.3	139,514.1	1,465,858.4	59.8	30.7	9.5	100
Total egg-production, dozen					%	%	%	%
Land.....	d.	d.	d.	d.	0.75	1.05	0.64	0.82
Permanent improvements.....	2.24	2.79	1.98	2.38	6.00	9.67	6.58	7.01
Movable equipment.....	0.51	0.49	0.71	0.53	1.38	1.70	2.37	1.54
Fowls.....	0.97	1.23	1.10	1.06	2.61	4.27	3.64	3.13
TOTAL CAPITAL.....	4.00	4.81	3.98	4.25	10.74	16.69	13.23	12.50
Feed purchased.....	21.06	15.15	17.72	18.92	56.49	52.58	58.89	55.67
Feed, own production.....	0.26	0.45	0.70	0.36	0.71	1.55	2.34	1.07
TOTAL FEED.....	21.32	15.60	18.42	19.28	57.20	54.13	61.23	56.74
European labour.....	2.44	0.52	0.27	1.64	6.54	1.82	0.90	4.83
Other labour.....	4.86	3.17	3.16	4.18	13.03	11.00	10.50	12.28
TOTAL LABOUR.....	7.30	3.69	3.43	5.82	19.57	12.82	11.40	17.11
General costs.....	1.28	1.32	1.56	1.32	3.43	4.88	5.19	3.88
Farm transport.....	2.13	1.64	1.11	1.88	5.72	5.08	3.70	5.54
Hired transport.....	0.08	0.05	0.46	0.11	0.22	0.16	1.52	0.37
Fowl purchases.....	0.85	1.47	0.76	1.04	2.29	5.11	2.52	3.05
Hatching costs.....	0.31	0.24	0.36	0.29	0.83	0.83	1.21	0.86
TOTAL COSTS.....	37.27	29.82	39.08	33.99	100	100	100	100

THE COST OF EGG PRODUCTION, 1944-45.

The cost of permanent improvements is as follows, per dozen eggs produced:

TABLE III.—*Fixed Improvements in Egg-Production:
Interest, Depreciation, and Repairs, in Pence per Dozen Eggs
Produced: 1944/45.*

Item.	W.P.	Rand.	Natal.	Three areas together.
	d.	d.	d.	d.
Interest.....	1.09	1.50	1.09	1.21
Depreciation.....	0.88	0.91	0.66	0.87
Repairs.....	0.27	0.38	0.23	0.39
TOTAL.	2.24	2.79	1.98	2.38

The cost of fixed improvements in respect of all three items viz., interest, depreciation and repairs, is highest on the Rand, probably because improvements are more expensive and the production of eggs per £100 permanent improvements is lower than in the other areas, viz., 799 dozen per £100 permanent improvements on the Rand as against 1102 dozen in the western Cape Province and 1096 dozen in Natal.

Movable Equipment.—The capital investment in movable equipment in poultry farming includes the purchase price or estimated value of movable feed hoppers, water containers, nests, perches, stoves and other movable heating apparatus, egg boxes and baskets, all movable crates for the transport of fowls and the isolation of broody or sick birds, incubators, spades, brooms, wheelbarrows, etc.

Fowls.—The investment in fowls is obtained by taking the average of the value of the flock at the beginning and at the end of the year. The numbers and value of fowls at the end of the year could be obtained in all cases, but figures for the beginning of the year were not accurate and were based on an estimate made by the farmer.

Feed.—In the year under discussion poultry farmers, almost without exception, bought all their poultry feed. In Natal there were isolated cases of farmers who produced a portion of their feed, especially their cereal requirements. For the rest they produced only green feed, and there are farmers who purchased even this commodity. The home-produced feed was taken at farm value or at an estimated value. In the three areas together, however, more than 97 per cent. of all feed was purchased.

Labour.—In comparison with other branches of farming, poultry farming as a rule requires less, yet more regular daily labour. The larger poultry farms generally employ European foremen, the smaller units being managed by the farmers themselves, often with a minimum amount of hired labour. Out of

a total of 73 farms, 20, of which 11 are situated in the western Cape Province, employed European labourers, most of them being foremen. Where labourers performed other work in addition to the duties incidental to poultry farming, the allocated cost was charged against the poultry concern. Similarly unpaid labour by members of the farmer's family, calculated according to normal scales, was debited to the poultry farm.

General expenses.—These include a number of smaller items in connection with poultry farming, such as the cost of medicines, blood tests, disinfectants, stationery, periodicals, association and registration fees, telephone, milling fees, insurance, assessment rates, bank fees, fuel for power and heating purposes, bookkeeping fees, and other smaller unspecified expenses.

Farm and hired transport includes all transport expenses incurred by the farmer himself in connection with his lorry, delivery van, motor car or animal-drawn vehicle as well as hired transport by road or rail.

Fowl purchases.—All purchases of chicks and fowls during the year were charged against egg-production.

Hatching costs.—All expenses in connection with the hatching of day-old chicks, i.e. capital investment, labour, fuel, etc., were calculated separately and charged against the total number of day-old chicks hatched. That portion of the total hatching costs charged against egg-production is in proportion to the number of day-old chicks kept by the farmers from their own production to raise for themselves. Thus the egg-producing flock bears the hatching costs of day-old chicks kept for maintaining the flock. The hatching costs of day-old chicks sold, are met from the sum realized by these chicks.

Calculation of net cost of egg-production.—In order to obtain the net costs of production, certain credits which are inseparably connected with egg-production, are deducted from the gross costs.

TABLE IV.—*Calculation of net cost of egg-production in pence per dozen eggs produced.*

Item.	W.P.	Rand.	Natal.	Three areas together.
Number of cases.....	25	31	17	73
Egg-production, dozen.....	875,685	450,659·3	139,514·1	1,465,858·4
Pence per dozen.		Pence per dozen.	Pence per dozen.	Pence per dozen.
Credits—				
(1) Breeding birds sold.....	—	0·52	1·01	0·26
(2) Table birds sold.....	12·47	3·56	3·86	8·91
(3) Fowls used on farm.....	0·12	0·17	0·28	0·15
(4) Manure sold.....	0·49	0·13	0·44	0·38
(5) Empty bags sold.....	0·33	0·23	0·48	0·32
(6) Increase in value of flock..	3·30	0·35	2·16	2·27
TOTAL CREDITS.....	16·71	4·96	8·23	12·29
Gross costs.....	37·27	28·82	30·08	33·99
Credits.....	16·71	4·96	8·23	12·29
NET COSTS.....	20·56	23·86	21·85	21·70

Discussion of Credits.

Breeding birds.—Although an attempt was made to exclude farmers who are concerned mainly with the breeding and sale of breeding cocks and hens, data were unavoidably obtained from a few farmers who sold breeding birds. In these cases it was impossible to separate the costs of breeding from those of egg-production. Sales of breeding birds were therefore charged against egg-production as a credit.

Table birds sold (killed or alive) include cockerels which are raised from day-old chicks up to a certain age, and old, non-producing culled laying birds. The comparatively high figure representing this item in the case of the western Cape Province, must be ascribed to the fact that in this area farmers concentrate mainly on the heavy breeds such as Australorps. The proportion of main breeds in the western Cape Province is approximately as follows: 45 per cent. Australorps; 43 per cent. Australorp × White Leghorn; 10 per cent. White Leghorns and 2 per cent. Rhode Island Reds. On the Rand, White Leghorns total approximately 85 per cent., and in Natal more than 70 per cent. of the flocks.

Increase in value of flock.—The increase in value of the flock was calculated by deducting the value as at the beginning of the year from that as at the end of the first year. As already mentioned, some farmers could not accurately state the number and value of their birds at the beginning of the year from the value at the end of the year. As already mentioned, some farmers could not accurately state the number and value of their birds at the beginning of the year, and consequently the relative figures represent an estimate made by the farmers.

The increase in value of fowls during the year must be attributed mainly to expansion. If the number of birds in a flock is kept fairly constant, the farmer will buy approximately the same number of day-old chicks or pullets every year to replace culls or losses through mortality. Where expansion is to take place, however, the farmer raises more day-old chicks or buys more pullets than are needed to replace culls or losses. In such cases the extra expense entailed by the raising of chicks or the keeping of pullets was included in the general expenses, and since the chicks and pullets were due to commence laying only during the following season, they represent, except in so far as they increased in value due to growth, a liability during the year of the investigation. The same value per bird was taken at the beginning and at the end of the year; consequently a change in total value means a change in the total number of fowls.

Net cost of egg-production: (a) with and (b) without commercial day-old chick production.—As already mentioned, separate calculations of egg-production costs were made for poultry farmers who sold day-old chicks and for those who did not. In Table V the comparative costs are given:—

TABLE V.—Comparative Cost of Egg-production: Enterprises With and Without a Commercial Day-old Chick Industry
in Pence per Dozen Eggs Produced.

Item.	WESTERN PROVINCE.		RAND.		NATAL.		THREE AREAS TOGETHER.	
	Egg producers.	Day-old chick producers.	Egg producers.	Day-old chick producers.	Egg producers.	Day-old chick producers.	Egg producers.	Day-old chick producers.
Number of cases.....	14	11	17	14	9	8	40	33
Egg-production, dozen.....	273,889	601,796	220,183·4	230,475·9	81,825	57,689·1	575,897·4	889,961
Costs:—	d.	d.	d.	d.	d.	d.	d.	d.
Land.....	0·38	0·24	0·30	0·31	0·09	0·34	0·31	0·26
Permanent improvements...	2·68	2·04	2·26	3·29	1·47	2·70	2·34	2·41
Movable equipment.....	0·52	0·51	0·38	0·59	0·61	0·86	0·48	0·55
Fowls.....	1·12	0·90	1·04	1·41	0·74	1·60	1·04	1·08
TOTAL CAPITAL.....	4·70	3·69	3·98	5·60	2·91	5·50	4·17	4·39
Feed bought.....	24·44	19·51	14·22	16·05	15·52	20·83	19·27	18·70
Feed, own production.....	0·24	0·27	0·36	0·53	0·48	1·02	0·32	0·39
TOTAL FEED.....	24·68	19·78	14·59	16·58	16·00	21·85	19·59	19·09
Labour, European.....	0·97	3·10	0·23	0·80	0·28	0·26	0·59	2·33
Labour, other.....	3·88	5·30	2·36	3·95	2·32	4·34	3·08	4·88
TOTAL LABOUR.....	4·85	8·40	2·59	4·75	2·60	4·60	3·67	7·21

THE COST OF EGG PRODUCTION, 1944-45.

TABLE V. (Continued.)

Item.	WESTERN PROVINCE.		RAND.		NATAL.		THREE AREAS TOGETHER.	
	Egg producers.	Day-old chick producers.	Egg producers.	Day-old chick producers.	Egg producers.	Day-old chick producers.	Egg producers.	Day-old chick producers.
General expenses.....	1.21	1.31	1.13	1.50	1.26	1.99	1.18	1.41
Farm transport.....	1.72	2.32	1.55	1.72	0.94	1.37	1.54	2.10
Hired transport.....	0.12	0.07	0.02	0.07	0.48	0.42	0.14	0.09
Fowl purchases.....	1.32	0.64	2.59	0.41	1.29	0.12	1.79	0.55
Hatching costs.....	0.53	0.21	0.06	0.42	0.13	0.61	0.30	0.29
TOTAL GROSS COSTS...	39.12	36.43	26.52	31.03	25.58	36.47	32.38	35.03
Credits:—								
Breeding birds sold.....	—	—	—	1.02	—	2.44	—	0.42
Table birds sold.....	12.74	12.34	3.51	3.61	3.48	4.42	7.89	9.57
Value of fowls used on farm.	0.21	0.08	0.18	0.17	0.25	0.32	0.20	0.12
Manure sold.....	0.66	0.42	0.10	0.16	0.12	0.88	0.37	0.38
Empty bags sold.....	0.42	0.29	0.22	0.23	0.47	0.48	0.35	0.29
Increase in value of flock..	7.33	1.46	0.25	0.44	0.78	4.14	3.69	1.39
TOTAL CREDITS.	21.35	14.60	4.26	5.63	5.10	12.68	12.31	12.15
Net costs.....	17.77	21.83	22.26	25.40	20.48	23.78	19.87	22.88

Profit per dozen fresh eggs sold.—The following table reflects the income as well as the profit per dozen fresh eggs sold, for all farmers in each of the three areas.

TABLE VI.—Average income and profit per dozen fresh eggs sold, for all farmers: 1944/45.

Item.	W.P.	Rand.	Natal.	Three areas together.
Number of cases.....	25	31	17	73
Fresh eggs sold, dozen.....	806,368	405,876	120,085	1,332,329
Value of fresh eggs sold.....	£95,020·0	£46,525·2	£13,340·0	£154,885·2
Value per dozen fresh eggs sold..	28·28d.	27·51d.	26·66d.	27·90d.
Net cost per dozen.....	20·56d.	23·86d.	21·85d.	21·70d.
Profit per dozen fresh eggs sold..	7·72d.	3·65d.	4·81d.	6·20d.

Financial Result of Farming as a Whole.

Up to this point, all expenses have been calculated per dozen eggs produced, and profit per dozen eggs sold. The financial outcome of poultry farming as a whole will now be analyzed.

In table VII the average operators' earnings per farm are shown for all farmers, and in table VIII the average operators' earnings per farm are shown separately for farmers who go in for commercial day-old chick production and for those who do not.

TABLE VII.—Average operators' earnings per farm for all poultry farmers 1944/45.

Item.	W.P.	Rand.	Natal.	Three areas together.
Number of cases.....	25	31	17	73
	£	£	£	£
Gross costs.....	5,127	1,577	966	2,650
Credits.....	2,460	311	293	1,042
Net costs.....	2,667	1,266	673	1,608
Income.....	4,400	1,794	1,054	2,514
Net costs.....	2,667	1,266	673	1,608
Net income.....	1,733	528	381	906
Interest.....	385	212	100	245
Operator's Earnings.....	1,348	316	281	661

During the year under discussion poultry farmers in the western Cape Province totalled an average of £1,348 in operators' earnings per farm as against £316 on the Rand and £281 in Natal.

THE COST OF EGG PRODUCTION, 1944-45.

TABLE VIII.—*Total income, gross costs, total credits, net income, interest and operator's earnings for poultry farms with and without a day-old chick-industry: 1944/45: Average per farm.*

Item.....	Egg producers.				Commercial day-old chick producers.			
	W.P.	Rand.	Natal.	Three areas together.	W.P.	Rand.	Natal.	Three areas together.
Number of cases.....	14	17	9	40	11	14	8	33
Item								
Income from :—	£	£	£	£	£	£	£	£
Fresh eggs.....	2,231	1,320	955	1,557	5,798	1,720	593	2,806
Hatching eggs.....	48	77	—	49	22	28	34	27
Infertile eggs.....	—	—	—	—	19	1	—	7
Day-old chicks.....	—	—	—	—	1,262	527	538	775
TOTAL INCOME.....	2,279	1,397	955	1,606	7,101	2,276	1,165	3,615
Gross costs :—								
Feed.....	2,012	787	606	1,175	4,510	1,137	656	2,145
Labour.....	395	140	99	220	1,916	326	138	810
Fowl purchases.....	107	140	46	107	147	28	4	62
Transport.....	150	85	54	101	544	123	54	246
General expenses.....	98	61	48	71	299	103	60	158
Depreciation.....	120	50	34	71	231	89	44	125
Repairs.....	23	16	5	16	95	39	11	51
Hatching eggs bought.....	—	—	—	—	32	8	28	21
Hatching and sale of day-old chicks.....	28	2	4	12	146	84	50	97
TOTAL GROSS COSTS...	2,933	1,281	896	1,773	7,920	1,937	1,045	3,715
Credits :—								
Breeding birds sold.....	—	—	—	—	—	70	73	48
Table birds sold.....	1,038	190	132	474	2,815	248	133	1,076
Manure sold.....	54	5	5	22	96	11	27	43
Empty bags sold.....	34	12	18	21	66	16	14	32
Fowls for home consumption.	17	10	9	12	18	11	10	13
Eggs for home consumption.	19	5	10	11	22	16	12	17
Increase in value of flock...	598	13	29	222	333	30	125	154
TOTAL CREDITS.....	1,760	235	203	762	3,350	402	394	1,383
Gross costs.....	2,933	1,281	896	1,773	7,920	1,937	1,045	3,715
Credits.....	1,760	235	203	762	3,350	402	394	1,383
NET COSTS.....	1,173	1,046	693	1,011	4,570	1,535	651	2,332
Income.....	2,279	1,307	955	1,606	7,101	2,276	1,165	3,615
Net costs.....	1,173	1,046	693	1,011	4,570	1,535	651	2,332
Net income.....	1,106	351	262	595	2,531	741	514	1,283
Interest.....	257	150	73	170	547	286	130	335
Operator's earnings.....	849	201	189	425	1,984	455	384	948

Average production costs of day-old chicks hatched and day-old chicks sold and profit on day-old chicks sold.—Table IX reflects the average production costs per day-old chick hatched and per day-old chick sold, as well as the profit per day-old chick sold. In the case of "Egg producers", the average production costs are given

only in respect of day-old chicks hatched. since no day-old chicks were sold. In the group "Day-old chick producers", the average production costs of both day-old chicks hatched and day-old chicks sold are given. Expenses in connection with the latter include costs incidental to the sale of the chicks, such as packing and transport.

TABLE IX.—*Production costs of day-old chicks hatched and day-old chicks sold, and profit per day-old chick sold: 1944/45; average per farm..*

Group.....	Egg-producers.				Commercial day-old chick producers.			
Item.....	W.P.	Rand.	Natal.	Three areas together.	W.P.	Rand.	Natal.	Three areas together.
Number of cases.....	14	17	9	40	11	14	8	33
Eggs to incubator (dozen)....	531	30	116	225	4,974	2,054	1,687	2,939
Net costs of own eggs in incubator.....£	37·6	3·4	14·2	17·8	530·2	214·0	164·6	307·5
Cost of purchased hatching-eggs	—	—	—	—	32·0	8·0	27·8	20·8
Hatching costs (fuel, labour, interest, repairs, capital depreciation).....£	45·1	3·2	7·3	18·8	144·6	106·7	54·6	106·7
Total, eggs and hatching costs.	82·7	6·6	21·5	36·6	706·8	328·7	247·0	435·0
Credits: infertile eggs sold....£	—	—	—	—	18·4	1·0	—	6·6
Net egg and hatching costs..	82·7	6·6	21·5	36·6	688·4	327·7	247·0	428·4
Number of chicks hatched....	4,325	337	713	1,818	39,154	13,439	11,504	21,542
Percentage chicks hatched from eggs in incubator.....	68	89	51	67	66	55	57	62
Cost per day-old chick.....d.	4·59	4·70	7·24	4·83	4·22	5·85	5·15	4·77
Number of day-old chicks sold	—	—	—	—	22,269	9,559	8,652	13,576
Production costs of day-old chicks sold.....£	—	—	—	—	454·7	239·7	189·8	299·3
Costs incidental to sale of day-old chicks sold.....£	—	—	—	—	41·2	13·1	14·9	22·9
Cost of production and sale of day-old chicks.....£	—	—	—	—	495·9	252·8	204·7	322·2
Cost of production and sale per day-old chick.....d	—	—	—	—	5·34	6·35	5·68	5·70
Income from day-old chicks sold.....£	—	—	—	—	1,262	527	538	775
Income per day-old chick sold..d.	—	—	—	—	13·60	13·23	14·92	13·70
Cost per day-old chick sold...d.	—	—	—	—	5·34	6·35	5·68	5·70
Profit per day-old chick sold...d.	—	—	—	—	8·26	6·88	9·24	8·00

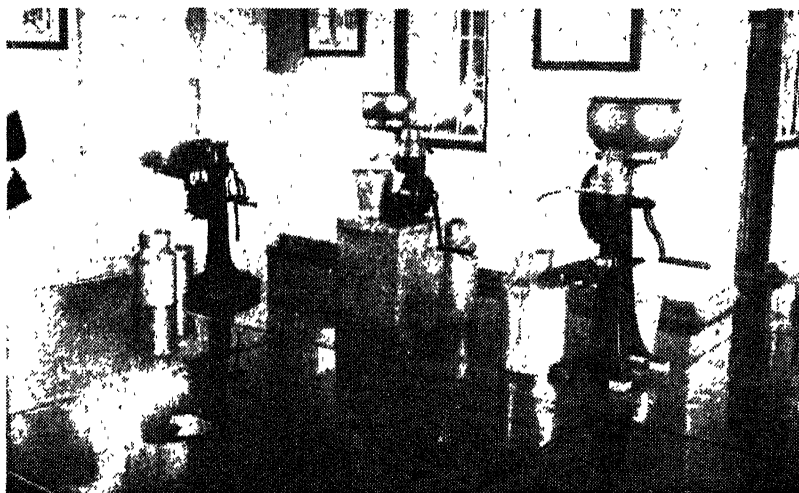
The Handling of Milk and Cream on the Farm.*

(Division of Dairying.)

II. The Farm Separator.

IF the object of the farmer is to produce cream, then a separator is necessary. The old "setting-pan" methods are out-of-date and quite unsuitable in a hot country where it is so essential to produce a first-grade cream. Many machines are on the market. A cheap machine is dear at any price.

Principles of Separation.—The constituents of milk vary in weight, the butterfat being the lightest. By subjecting the milk to centrifugal force, the lightest portion, that is the fat with a part of the other constituents, is separated from the heavier portion, the skim-milk. The difference in weight or specific gravity of milk, skim-milk and butterfat is very slight; hence considerable centrifugal force is required. The milk must be in the right condition for separation and the machine must be properly mounted and run, otherwise the separation may not be complete and there will be a loss of butterfat in the separated milk.



Add life to your machine by having it well mounted.

Condition of Milk.—The milk should be separated fresh, as it comes from the cow, as near blood heat as possible and never below 86° F. At this temperature the milk is less viscous and the fat globules are in the liquid state. If the milk is allowed to cool, the fat globules become solid and the milk more viscous, with resultant poor separation. Cream from cold milk may contain a higher percentage of butterfat, but there will be less cream and a heavy loss of fat in the separated milk. In cases where milking is done twice a day and separation only once, the cold milk must be heated up to at

* The first part appeared in the September, 1946, issue.

least 90 degrees Fahrenheit before putting it into the separator. The practice of separating once a day in the summer is not recommended. The milk held over is liable to become acid, and there will be a heavy loss of fat in the separated milk. If too acid, it may become thick upon heating to separating temperature.

Choice of Machine.—With the multitude of good, bad, and indifferent machines on the market, the farmer should be careful in his selection. Do not rely too much on what the man behind the counter has to say; in many cases he knows less about the matter than the intending purchaser. A cheap machine will prove expensive in the long run, due to getting out of order quickly and loss of fat in the separated milk. The bowl of the separator revolves at anything from seven to sixteen thousand revolutions per minute, depending on the type and size of the machine. The separator is used twice a day all the year round, and if the machine is to stand up to the work, it must be made of good material and be well constructed.

In making a selection the following points should be considered: (a) Skimming efficiency; (b) general construction; (c) possibility of obtaining spare parts; and (d) capacity of machine.

(a) *Skimming Efficiency.*—It is essential to obtain a clean skimming machine—one that will leave the minimum amount of butterfat in the separated milk. The difference in the skimming efficiency between a poor and a good machine, will more than pay the difference in the initial price when buying a separator. The following figures will make this clear. A first-class machine will not leave more than 0.03 per cent. of fat in the separated milk, whereas a poor machine may leave anything from 0.06 to 0.1 per cent. If you are separating 30 gallons of milk a day, and 10 per cent. is taken off as cream, the good machine will lose 29½ lb. of butterfat in a year as compared with a loss of 59 lb. in the case of a machine losing 0.06 per cent. in the separated milk. If you take the life of the separator as ten years (which is short for a good machine), and the value of butterfat at 1s. a pound, you will receive £14. 15s. more for your cream with the good machine than with the poor one, and in addition there will be freedom from trouble. The difference in initial cost between a good and a poor machine is somewhere in the neighbourhood of £3 to £4 on a 45-gallon capacity separator.

(b) *General Construction.*—The framework must be substantial, and the various pieces which go to make it up, must fit closely together so as not to leave crevices in which spilt milk is likely to lodge. All bushings and bearing surfaces should be reasonably large to stand the wear of daily use.

The tinware should be strong and substantial. Take particular notice to see that all joints are soldered flush. Open joints and crevices are difficult to keep clean. Machines having this fault should be avoided.

The putting together of the bowl should be foolproof—it is so in most good machines and it should not require a lot of tools to take the bowl apart. Usually two are sufficient—a wrench and some kind of clamp to hold the bowl while it is being unscrewed. There are two general types of bowls: those that are hollow and those which have internal parts in the form of discs or blades to assist in the separation. Separators with hollow bowls depend on high speed for complete separation. With the disc type of bowl, look to see that

the discs can be fitted in any order. Numbered discs are not recommended where the separating is left to a native, because, if put on incorrectly, the bowl will be out of balance and this will lead to trouble with the neck bearing.

The bowl, its parts and the tinware in general, should be easy to keep clean. Inaccessible places, which require special brushes and bits of wire, are a nuisance. Most machines can be cleaned with ordinary bottle brushes obtainable from the local store or chemist when the brushes sent with the machine are worn out.

The size of the supply tank should be noted. If the capacity of the machine is 50 gallons per hour, then the tank should hold at least 5 gallons of milk; if 60 gallons per hour, at least 6 gallons; and so on. A small supply tank in a big capacity machine means constant refilling.

The method of oiling the machine is very important. The mechanism is more delicate than that of most other farm machines; the bowl revolves at a very high speed, and sometimes the machine is run for an hour or more. Friction due to lack of proper oiling at any one point of the machine is likely to throw the gearing out of alignment and so damage the separator.

Most good machines are fitted with the "splash oiling system". The gearing is partly submerged in oil and is so arranged that the oil is splashed on to all wearing parts of the machine when it is in motion. This is undoubtedly the most satisfactory system as there is no need to worry about whether the boy has oiled the machine or not. With the "open hole" system, that is, where one pours oil into various little holes, one is never certain as to whether the machine has been properly oiled before starting up; and, if the machine has to be run long, it may be necessary to stop for re-oiling.

Whatever system your machine has, use only separator oil. Ordinary machine oil is too thick and will cause the bearing to "gum up." With the splash system, empty the oil once a month from the oil sump; a special outlet is provided for this purpose. Put a little paraffin in the sump, turn the handle, let the dirty paraffin out, and refill with fresh oil. If this is done regularly years will be added to the life of the machine.

(c) *Obtaining Spare Parts.*—If you are unable to obtain spare parts for your machine when these are required, the machine is useless to you. The parts which usually require replacing are: the rubber ring, neck bearing spring, and the steel points or balls on which the spindle rests. A set of spares is usually sent out with the machine and when one of these spares is put into use, another should be ordered at once. Do not wait till you want to use it before ordering, as you may find that you have to wait a few days to obtain the required part. Many cheap machines are on the market for a year or so, and, after various complaints from users, the agent gives the machines up and spare parts are no longer obtainable. For the better known machines, spares are always to be had and the addresses of the agents can usually be seen in the agricultural press.

(d) *Capacity of Machine.*—Hand separators can be obtained with capacities of from 10 to 130 gallons per hour. As a rule, the smaller the machine, the cheaper and easier it is to turn, but these points should not influence the choice. A small capacity machine is all very well for the person keeping one cow or a couple of goats, but for the ordinary farmer anything under 50 to 60 gallons per hour is not recommended. Turning a handle for hour after hour is not easy work. The smaller the machine, the faster the bowl has to revolve to effect separation and the sooner will the machine wear out. To

put a lot of milk through a small machine means that some of the milk is liable to be cold before it is separated; the calves will get cold skim-milk instead of warm; and the machine will have to be stopped during the run to clean out the bowl. The larger the machine, the quicker the work will be done, and the longer the machine will last; and, if the herd increases, the same machine will do.

Setting Up the Separator.

The life of the separator can be lengthened by having the machine properly set up.

The accompanying figure shows three kinds of machines, that on the left being of the "hanging spindle" type; the centre one is an ordinary "vertical spindle" machine without a stand; and on the right is an ordinary vertical spindle machine with stand.

Many machines without stands are mounted on rickety tables or grocery boxes. This is fatal to efficient skimming or the long life of a machine. *There must be no vibration.*

A machine with a hanging spindle may be bolted direct to a concrete or other hard floor, whereas a machine with a vertical spindle must have a cushion in the form of blocks of wood between the mechanism and the floor. This is provided for in some machines by inserting blocks of wood between the mechanism and the stand. If, however, the part containing the mechanism is bolted direct to the stand, then blocks must be placed between the stand and the floor, or the blocks may be sunk into the floor with the top flush with the floor level. The object of the blocks is to take up vibration. With the hanging spindle type of machine the vibration is provided for by means of springs in some machines, and by ball bearings in others, or a combination of both. Note the blocks of wood between the separator and the floor in the case of the machine on the right in the illustration.

Any machine which has no stand and therefore cannot be bolted to the floor, must have a firm base made for it. The stand of the centre machine in the illustration is made of brick and outside cement-plastered. Four bolts are let into the stand during construction. A piece of 2-inch thick wood is held down by these bolts, holes being countersunk in the wood to take the nuts. Over this is placed a piece of good galvanized iron, with a turnover of three inches all round the sides. Any separator can then be fitted to this stand with the coach screws usually supplied with the machine.

The separator must be perfectly level. With the hanging spindle type of machine use the plumb-line supplied in order to set it correctly. With all vertical machines, the circular rim on the framework into which the bowl fits, is specially ground for the use of a spirit level. An occasional check should be made to see that the machine is still level and adjust it, if necessary, by using either washers or wedges of hard wood between the framework or stand and the floor.

Care of Cream.

Whether for farm butter-making or for factory purposes, if first-grade butter is required, the cream must also be first-grade. However skilful the butter-maker may be, he cannot manufacture first-grade produce from second-grade raw material.

A first-grade cream may be defined as a cream having a clean well-matured flavour, a clean and pleasant odour, either sweet or of a pleasant acid flavour. It must show no lumps or curd particles or dirt of any kind, and must be of a smooth even consistency like a well-mixed paint. It should have a bright glossy appearance.

In order to produce cream of this nature, cleanliness in every detail during milking operations and subsequent separating and handling is essential.

Soap should not be used for cleaning dairy utensils. It does not dissolve milk constituents and, not being a good rinser, it may leave a film over the apparatus in which undesirable organisms will develop. Use washing soda or, better still, one of the dairy cleansing powders specially made for the purpose. A scrubbing brush is far more effective and easier to keep clean than a cloth.

Keep the separator clean. Wash it thoroughly each time after use and place the parts (covered over with butter muslin), in a clean, airy place. Do not put the machine together until required for use.

After separating is finished, the cream should be immediately covered with clean muslin and put in a cool place free from dust and odours.

Never run the warm cream from the separator into a vessel already containing cool cream; the mixing of cool and warm cream is liable to set up undesirable fermentations. Cream separated in the morning should be held over until the afternoon before mixing it with the bulk cream. Likewise, that separated in the evening should be held over until the next morning before mixing. This will ensure both lots of cream being more or less the same temperature.

Stir the cream at least twice a day—the more often the better. Stirring round and round is useless, as the cream will remain in layers. It must be done with an up-and-down motion. This will break up the various layers that form when cream has been left standing. The object of stirring is to allow the gases to escape, to prevent the formation of curdy matter at the bottom of the container, to prevent the formation of lumps, to prevent a tough top covering, and to break up “acid-zones” and so ensure even ripening throughout the cream.

Never put a tight-fitting cover on the can in which you keep your cream; a free circulation of air is necessary. So simply cover the top with a clean piece of butter-muslin to keep out flies and dust.

If cream is sent to a creamery, the following points should be observed:—

(1) Adjust the cream screw (or skim-milk screw) of the separator so as to give a cream testing 45 per cent. butterfat during hot weather and 35 to 40 per cent. during cold weather. Thin cream sours very much quicker than thick cream, and if a thin cream has to be sent a long distance to the creamery, it is likely to arrive in an over-ripe condition. Some farmers send cream testing 60 per cent., but it is not advisable to exceed 50 per cent. as the body of the cream is likely to be spoilt and there is a danger of a considerable loss of butterfat in the separated milk, particularly if a cheap machine is being used or a large quantity of milk is being put through a machine of small capacity. A thinner cream is advised in the winter, as it is easier to keep well stirred and mixed.

(2) Do not keep your cream in the cans that go to and from the creamery. Such cans receive a lot of rough treatment, and are often battered and dented with the result that pieces of tin may be knocked off the interior surface and so expose the iron. Cream kept in such cans for a few days is liable to develop a metallic flavour. It is better to have a separate container in which to hold the cream until sent away. During hot weather send cream to the creamery three times a week, and twice a week during cold weather.

(3) Protect the cream from the rays of the sun during transport from farm to station by covering the cans with a wet sack. Make sure that the can is placed in a shady spot until the arrival of the train.

If the train service permits, it is better to send cream away by a night train than by day.

Grading Cream.

The creameries are dependent on the farmer, and the building up of the dairy industry is dependent on the creameries. Both sections must work together for their mutual interests.

The farmer should take a personal interest in the work carried on by the creamery. If he would pay an occasional visit during the hot weather to see the cream grader at his work, he would learn more about the faults found in cream than by studying half a dozen books on the matter.

The grading and testing of cream at the creameries is carried out by specially trained men holding Government certificates entitling them to do this class of work. A record has been kept at the factory showing what grade and test is given to every can of cream received. This enables the Government dairy inspectors to keep a constant check on the work of the graders and testers. The inspectors intercept cans *en route* to the factories, take samples for grading and testing, and then compare their results with those given by the factory.

Grading is done by the senses of *sight, smell and taste*.

At the factory, as the lid is removed from the can, the grader notes the condition and general appearance of the can and its contents. Cans that are badly dented, rusted or have open seams, do not appeal to him as being suitable containers for cream from which first-grade butter can be made. The surface appearance catches his eye; the presence of flies or other insects and particles of dirt is an indication of neglect. Mould on the top of the cream affects its quality and will probably produce mould in the butter; it indicates unsuitable surroundings or storage.

A tough covering on the surface denotes neglect in stirring the cream. A frothy or aerated surface gives rise to a suspicion that separation has taken place in the cream can direct, or that it may be due to neglect in stirring.

Gas bubbles on the surface of the cream are due to gas-forming bacteria associated with manure or yeast cells due to dirty operations during the milking process.

He next stirs the cream.

Hard, tough portions throughout the body of the cream are an indication of want of proper mixing or stirring of the cream.

Curdling is caused by having a very thin cream or by mixing warm and cold cream together.

Ropiness is generally associated with the use of unsanitary water.

A slimy condition denotes the presence of undesirable bacteria.

During stirring, the body of the cream is noted. All good cream has an even body with the consistency of a well-mixed paint, and has a bright appearance; a dull colour usually indicates over-ripeness.

The odour of the cream is also noticed during the stirring process, and, if very bad, it is noted immediately the lid is removed.

A stable odour is due to unsanitary byre conditions.

An over-ripe cream, besides being dull in colour, may have either a strong acid, vinegar, rancid or stale odour.

Feed odours, if pronounced, can be detected on stirring.

The next thing is to taste the cream. *Flavour* is the all-important characteristic that determines the grade and value of the cream and subsequent butter.

THE HANDLING OF MILK AND CREAM ON THE FARM.

The following defects, if not already found, will be detected by taste: unclean, over acid, rancid, tallowy, musty, metallic and food flavour.

It must be remembered that most defects are due to bacteria, and that bacteria take some time to develop these defects. Hence, cream that is apparently sound when it leaves the farm, may be faulty by the time it reaches the factory. In order to avoid these defects it is therefore essential that every care be taken from the time the cow is milked till the cream reaches its destination. *No other food products will undergo changes as rapidly as milk and cream.*

Varying Cream Tests.

The testing of milk or cream is a chemical and mechanical process for which definite instructions as to method are laid down by law.

The fact that cream tests vary from day to day is quite normal even when the separator is operated with the utmost precision. With accurate working of the machine the ratio of cream to skim-milk remains constant until the cream regulating screw is altered. Herd milk will vary in its fat content almost daily, and this will cause variation in the cream test. For example, suppose you have 100 lb. of milk testing 3 per cent. butterfat. You put this through the separator and find that you have 10 lb. of cream and 90 lb. of skim milk. The three pounds of butter-fat from the milk have gone into the ten pounds of cream (omit the small loss in the separated milk), so that the ten pounds of cream will show a 30 per cent. butter-fat test. Now, if on the next occasion the milk tests $3\frac{1}{2}$ per cent. and the operations are carried out in just the same way, your ten pounds of cream will test 35 per cent. In this instance, the operation of the separator has nothing to do with the test varying. The variation of fat content in the milk of a well managed herd should not amount to much, but with herds milked in the open kraal and with poor supervision, the difference may be as much as $1\frac{1}{2}$ to 2 per cent. If the weather is wet or if there is a beer party on, native boys are often in a hurry to get the milking over and do not milk out the cows thoroughly, and, as the last milk is always the richest, this will account for a big difference.

As far as the separator is concerned, the greatest factor is the speed at which the handle is turned. The following figures show the result of an experiment carried out by this Division.

Speed Trials.

Weight of Milk.	Temperature.	Test of Milk.	Speed.	Percentage Fat in Cream.
lb.	°F.			
100	93	3.3	60	38
100	93	3.3	55*	29
100	93	3.3	50	22
100	93	3.3	40	17
100	93	3.3	Irregular.	32

* Correct speed.

The results show very conclusively that a slight drop in the speed makes a considerable difference in the resulting cream tests.

The temperature at which the milk is separated also influences the cream test. The normal temperature for separating is 86 degrees

Fahrenheit. Cold milk will give a small quantity of high-testing cream and there is likely to be a large loss of fat in the separated milk.

The rate of inflow is controlled by the float, and in some cases, if the float is removed, more milk will be forced through the machine than it was made to handle. This will give a large quantity of low-testing cream with a loss of fat in the separated milk. If the supply tap is not fully open, the result will be less cream with a higher fat content.

Flushing the bowl with water or separated milk after separating will vary the test unless the amount used each time is proportional to the amount of milk separated.

Worn bearings, bowl vibration, machine not level, or worn out internal bowl devices, will also make a difference in the test.

The separation of cream from milk is a delicate operation and the slightest irregularity will cause big differences in the resulting cream tests.

Save Your Grain Bags.

Owing to the present critical shortage of containers, especially for maize, wheat, potatoes, etc., an urgent appeal is made to farmers, urban householders, produce dealers, industrialists, etc., to safeguard used and new bags of all descriptions, as well as all other jute products. This shortage is not caused by, although it is aggravated by, the sanctions placed by India on the export of jute products to South Africa. During the period July 1945 to June 1946 South Africa could only obtain half of its normal annual requirements of 55,000 tons of jute products, but for the year July 1946 to June 1947 no supplies have been forthcoming, and it is, therefore, imperative that stringent control should be exercised over the existing supplies in the Union, and that other types or supplies of container material should be sought.

The Department of Commerce and Industries is busy setting in motion a propaganda campaign to get all the bags lying in backyards mobilized for national use. Furthermore, regulations have been promulgated for the compulsory return to the seller of all bags used for the supply of produce.

Farmers are, therefore, urged in their own interests to collect and conserve all bags on their properties, and to mend all damaged bags in such a way that they could still be used as containers for the marketing of the Union's maize, wheat, potato crops, etc.

A clarion call is now made for a truly national effort to carry the Union through the present crisis.

It is the solemn duty of every citizen to assist in our effort to recover every available container for the conveyance of the country's produce to market and to the consumer.

The authorities are in the meantime investigating the possibilities of obtaining a permanent substitute for jute from South African grown fibres.

The urgent need now is for the preservation of all existing stocks of bags and it is in this direction that every citizen can play a material part in the effort.

Therefore, save all bags; use all types of bags; and prevent wastage in container material.

The Colorado Potato Beetle.

C. P. v. d. Merwe, Chief Inspector, Plant Regulatory Service,
Department of Agriculture.

OF the many notorious insect pests which attack the crops of farmers and gardeners, the Colorado potato beetle (*Leptinotarsa decemlineata*) is one of the foremost. This beetle comes from the Rocky Mountains in the United States of America, where it originally lived on a wild plant, closely related to the potato. About the middle of the nineteenth century, however, it began attacking potatoes, and then began to spread over the continent, reaching the eastern shores of America in 1874. It often flies high and can therefore easily be carried for long distances by the wind. In addition it seems to be able to adapt itself to a wide variety of climatic conditions, and at present has established itself from the southern United States right up to Canada.



Colorado Potato Beetle: a, egg patches; b, young larvae; c, pupa; d, mature beetle; e, the fore wing much enlarged to show markings.
[Illustration from Bulletin No. 47, Fort Collins Experiment Station, Colorado, U.S.A.]

More than once it was carried to Europe in ships, and made its appearance in England as well as on the Continent. Fortunately, however, it was always discovered in time and eradicated before it could establish itself. During the first World War, however, it was imported into France, probably in military supplies, and was discovered only in 1922, after having been in the country for two or three years. Attempts were made to eradicate it, but these were futile and the pest spread eastwards aided by the prevailing west winds, into Belgium, Holland, Luxembourg, Switzerland and Germany. How far it has spread towards the east cannot yet be said with certainty. In France it gradually spread to the north coast, as well as southwards across the border into Spain. During the German occupation of France and the Channel Islands, it was carried to the Jersey islands, where attempts are now being made to eradicate it. This pest is repeatedly being carried or blown over to

England but up to the present it has not succeeded in gaining a foothold. Towards the end of 1943 it made its appearance on the Gold Coast of West Africa. How it got there no one can tell, although it may possibly have been carried over by airplane.

Description.

The beetle is oval in shape and about half an inch long. It is yellow-bodied with black longitudinal stripes. The larva is hump-backed and is red or orange-coloured with a black head. Both larva and beetle live on the foliage of potato plants, although they also attack other plants belonging to the potato family, such as tomatoes and various types of weeds and wild plants. When full-grown, the larva burrows into the soil, pupates and later emerges as a beetle. One or more generations may occur during the year, according to the duration of the warm season.

Although the Colorado beetle is essentially a pest of potatoes, there is no great danger of its being introduced into South Africa in seed potatoes from North America or Europe. When seed potatoes are lifted for export to this country, the insect has already left the plant to hibernate, and even if it were accidentally included in a consignment, it would not survive the long voyage. There is, however, danger of its being transported by air. Flying beetles may seek shelter in aircraft or come to rest on baggage or other articles which are subsequently taken on board. On arrival here they will fly away in search of plant food, where they will lay their eggs. It is difficult to say how great the danger actually is, since measures are taken to prevent the importation of insects by aircraft. The change in climate from the northern to the southern hemisphere may also be unfavourable, but the pest is sufficiently important to justify all preventive measures. If it enters the country and is discovered in time, it may possibly be eradicated, although that depends on how far it spreads before being discovered. Any person finding a beetle or larva answering to the above description, is urgently requested to send it to the Chief, Division of Entomology, P.O. Box 513, Pretoria. If it is a larva, a potato leaf may be enclosed for food. It is a good idea to despatch the insect in a small tin; if a cardboard box is used, the address must be written on a label and attached to the box. Do not think that the insect is harmless if it apparently does no harm. Rather make sure by having it examined. In some parts of the country the potato ladybird causes extensive damage to potato plants, but it must not be confused with the Colorado beetle. The red ladybird with black spots, as well as its larva or "hedgehog", (so called because of its appearance) which is yellow in colour and covered with small spines, is well-known. This parasite is indigenous to S.A., whereas the Colorado beetle will be a newcomer.

Crops and Markets

A Statistical and Economic Review of South African Agriculture

by

The Division of Economics and Markets

Volume 25

OCTOBER 1946

No. 290

CONTENTS

	PAGE.
Price Review for August 1946	709
Maximum Prices of Farm Feeds	710
Index of Prices of Agricultural and Pastoral Products	711
Agricultural Conditions in the Union during August, 1946	711
Import Duty on Kaffircorn	712
Maximum Prices of Potatoes	712
Price Tables and Index	713

Price Review for August, 1946.*

Deciduous Fruit.—In comparison with the previous month the markets were supplied with larger quantities of apples, and prices remained firm.

Tropical Fruit.—During the month supplies of avocados decreased gradually, and prices increased, namely: on the Cape Town market from 4s. 1d. per tray in July to 5s. 7d. per tray in August; on the Durban market from 1s. 9d. to 5s. 1d., and on the Johannesburg market from 5s. 6d. to 5s. 10d. Papaw consignments were better represented, and prices showed decreases on most of the markets, namely: on the Durban market from 2s. 7d. per tray in July to 2s. 6d. per tray in August; on the Johannesburg market from 5s. 4d. per box in July to 4s. 4d. per box in August; on the Port Elizabeth market from 6s. 3d. per box to 4s. 9d. per box; and on the Bloemfontein market from 4s. 11d. per box to 4s. 4d. per box.

Bananas realized high prices on the Cape Town and Pretoria markets. On the Cape Town market the price per crate increased from 60s. 11d. in July to 72s. 1d. in August, and on the Pretoria market from 25s. 8d. to 31s. 5d. Other tropical fruit was supplied in small quantities and supplies were well sold at prices on the level of the previous month.

Citrus Fruit.—Small offerings of grapefruit and lemons registered weak sales. Insufficient quantities of navel oranges as well as a few pockets of the new season's Valencia oranges were disposed of at maximum controlled prices.

Tomatoes.—Deliveries were large and prices were sometimes low. The supply was often excessive. Some of the consignments which were offered, were over-ripe and of poor quality.

* All prices mentioned are averages.

Potatoes.—The markets were usually well supplied with potatoes. Third-grade potatoes were well represented, but first- and second-grade potatoes were insufficiently supplied. Potatoes were sold at higher prices than those of the previous month, as the new controlled prices came into operation during the month. There was keen competition for good quality consignments, and supplies sold well at maximum controlled prices.

Onions.—Moderate supplies were offered, and on some of the markets the prices of onions increased considerably. On the Johannesburg market the prices of Transvaal onions increased from 11s. 10d. per bag in July to 14s. 9d. per bag in August, and Cape onions from 14s. 3d. to 17s. On the Cape Town market Cape onions increased from 12s. per bag in July to 13s. 7d. per bag in August; on the Pretoria market from 15s. to 15s. 10d.; and on the Durban market from 15s. 6d. to 18s. 7d.

Sweet Potatoes.—Smaller supplies were offered and increases in prices were indicated, namely: on the Johannesburg market from 15s. 2d. per bag in July to 16s. 10d. per bag in August; on the Durban market from 15s. 2d. to 16s.; and on the Cape Town market from 17s. 4d. to 18s. 3d.

Vegetables.—Green beans and green peas were offered in small quantities, and in comparison with those of the previous month prices increased somewhat. On the Johannesburg market the prices of green beans increased from 3s. 2d. per pocket in July to 6s. 3d. per pocket in August; on the Cape Town market from 1s. 11d. to 4s. 2d.; and on the Durban market from 2s. 2d. to 6s. 6d. The prices of green peas showed the following increases: on the Johannesburg market from 2s. 7d. to 5s. 10d.; on the Cape Town market from 3s. 6d. to 5s.; and on the Durban market from 3s. 4d. to 4s. 9d. Cabbages were particularly plentiful and prices were low. Cauliflower consignments increased towards the middle of the month and sold well. Moderate supplies of pumpkins were offered, but good quality pumpkins were scarce and dear.

Fodder.—The Johannesburg market was well supplied with teff, but the quality was poor and only a portion of the supply realized the maximum price. Limited quantities of lucerne and oats were offered. Small quantities of green lucerne and green barley realized high prices.

Poultry and Poultry Products.—The markets were well supplied with eggs, but poultry offerings were small, and ducks and geese were scarce and dear.

Maximum Prices of Farm Feeds.

THE maximum prices of all registered farm feeds, farm feed mixtures and any locally produced animal or vegetable protein feeds, as well as of carcase meal, meat meal, blood meal or fish meal are frozen at the June 1946 rates. This, however, does not include bones, bone meal, degelatinized bone flour and stock licks, or lucerne or teff hay.

As a result of the world shortage of protein-rich feedstuffs and the consequent limited quantities which can be imported, it has been decided to control their importation, purchase and sale.

As from 23 August 1946 no person shall import, purchase or otherwise sell any protein-rich substance or bone meal or any bone product except under the authority of a permit issued by the Secretary of Agriculture.

The use of these feedstuffs other than for the feeding of animals or in the manufacture of mixtures or licks is already forbidden.

For this purpose a Protein Feed Committee has been appointed which will assist the Secretary of Agriculture in an advisory capacity in order to ensure an equitable division of all available supplies of protein-rich substances, bone meal and bone meal substances among feedstuff manufacturers and farmers. All traders in the above-mentioned substances must also render to the Protein Feeds Committee a monthly statement of supplies received. For full particulars see *Government Gazette Extraordinary* of 23 August 1946.

Index of Prices of Agricultural and Pastoral Products.

THIS index (see table elsewhere in this issue) decreased from 181 in July to 180 in August as a result of the decreases in the market prices of kaffircorn and eggs.

The index for "Summer Cereals" decreased from 246 in July to 243 in August as a result of the decrease in the price of kaffircorn.

The index for "Hay" decreased from 182 in July to 181 in August as a result of the decrease in the market price of teff hay.

The index for "Other Field Crops" increased from 306 in July to 324 in August as a result of the increases in the market prices of potatoes, sweet potatoes and onions.

The index for "Slaughter Stock" increased from 170 in July to 175 in August as a result of the seasonal increase in the price of cattle.

The index for "Poultry and Poultry Products" decreased from 218 in July to 183 in August as a result of the decrease in the market prices of eggs.

Agricultural Conditions in the Union during August, 1946.

Rainfall.—The south-eastern and western parts of the Cape Province experienced showers, but the precipitations were abnormal. In the rest of the Union it is dry, and rain is urgently needed in all parts.

Grazing was generally scarce and dry, and farmers, especially those in the Karoo, had to move their sheep. In the Transvaal and Orange Free State grazing was still reasonable.

Stock.—In the Cape Province the condition of stock is still good. Lumpy skin disease was still extremely prevalent in certain parts. In Natal the condition of stock weakened, and stock losses were caused by drought and nagana. In the Transvaal and Orange Free State the condition of stock is still reasonable, and in certain parts lumpy skin disease still prevails.

Crops.—In the Karoo, notwithstanding the drought, the winter crops are still promising. In Natal rain is urgently needed for the sugar-cane crop. Summer crops in the Transvaal and Orange Free State are still promising.

Import Duty on Kaffircorn.

THE import duty on kaffircorn (in the grain) in the Union, which has been temporarily suspended as from 27 July 1945, has again been introduced as from the beginning of September 1946. The import duty is 2s. per 100 lb. (See *Government Gazette* of 16 August 1946.)

Maximum Prices of Potatoes.

IN order to compensate producers of winter potatoes, who generally start marketing their potatoes towards the middle of August, for their higher costs of production, the prices of potatoes in the controlled areas were increased as follows as from 16 August 1946:—

In the case of potatoes sold direct by a producer to a trader, the maximum prices are 34s. 6d., 33s. 6d., 27s. 6d. and 22s. 6d. per bag free-on rail for 1st grade sized, 1st grade unsized, 2nd and 3rd grade respectively. The corresponding maximum prices of winter potatoes during the previous season were 34s. 6d., 33s., 30s. and 24s. per bag, respectively.

When the sale takes place by auction or otherwise on behalf of the producer by an auctioneer, a market agent, broker or other agent, the maximum prices are 35s. 3d., 34s. 3d., 28s. 3d. and 22s. 9d. per bag, respectively, including commission. Railage may, however, be added to this.

In the case of potatoes sold on behalf of a producer by a market agent, the maximum prices are 37s. 9d., 36s. 9d., 30s. and 24s. 3d. per bag, respectively, including railage, commission, transport and other market charges.

For potatoes sold direct by a producer to a consumer in quantities of 150 lb. or more at a time, the maximum prices are 38s. 6d., 38s., 31s. 6d. and 26s. per bag, respectively, free-on-rail producer's station or delivery at the buyer's premises.

The wholesale price is 38s. 6d., 37s. 6d., 31s. 2d. and 25s. 4d. per bag, respectively, while the retail price for quantities less than 150 lb. is 10d. per 3 lb., 10d. per 3 lb., 11d. per 4 lb., and 7d. per 3 lb. delivered free of charge to the consumer.

The maximum price at which undergrade potatoes may be sold by any person is 15s. per bag.

The maximum price of potatoes outside the controlled areas has been fixed at 11d. per 4 lb.

For full particulars, see *Government Gazette Extraordinary* of 16 August 1946, and for previous prices see "Crops and Markets", May 1946.

The maximum prices of seed potatoes remain unchanged as fixed on 13 October 1944, namely as follows:—

Government Certified A. 45s. per 150 lb.

Government Certified B. 42s. 6d. per 150 lb.

Seed potatoes, Government Inspected—40s. per 150 lb.

Average Prices of Lucerne, Teff, Kaffircorn and Dry Beans.

SEASON AND MONTH (b).	LUCERNE (per 100 lb.).			Teff Johan- nesburg (a) 100 lb.	KAFFIRCORN in bags (200 lb.).		DRY BEANS (200 lb.) bags.		
	Johannesburg (a).		Cape Town 1st grade.		F.o.r. producers' stations.		Johannesburg (a).		
	Cape.	Trans- vaal.			K1.	K2.	Speckled Sugar.	Cow- peas	Kid- ney.
1938-39.....	s. d. 3 10	s. d. 3 1	s. d. 4 0	s. d. 2 7	s. d. 13 1	s. d. 12 9	s. d. 25 0	s. d. 16 9	s. d. 24 2
1939-40.....	3 0	2 5	3 4	2 6	8 8	9 4	21 11	13 11	21 2
1940-41.....	4 2	3 5	4 3	3 3	15 6	17 0	30 0	16 8	27 11
1941-42.....	5 7	5 2	5 8	4 7	18 10	19 6	32 10	19 8	28 3
1942-43.....	5 5	6 0	7 4	5 5	24 10	24 10	34 0	25 8	24 2
1943-44.....	5 4	5 6	7 3	4 5	21 0	21 7	40 6	23 11	32 1
1944-45.....	6 4	5 4	7 2	4 9	18 8	18 8	88 7	30 6	70 6
1945—									
January.....	7 3	5 7	7 3	4 1	23 1	23 1	118 8	45 11	98 2
February.....	7 0	6 9	7 6	—	22 0	22 0	122 3	45 3	95 3
March.....	7 2	5 10	7 3	5 5	22 0	22 0	107 9	42 11	89 3
April.....	6 10	—	7 8	5 2	22 0	22 0	109 11	53 4	104 8
May.....	6 9	5 7	7 6	5 5	20 6	20 6	111 1	61 7	97 1
June.....	7 6	6 9	7 9	5 8	20 6	20 6	102 2	67 11	95 2
July.....	7 6	—	7 9	5 9	20 6	20 6	105 8	67 1	80 10
August.....	7 6	—	7 9	5 9	20 6	20 6	93 7	66 3	80 7
September.....	7 4	—	7 9	5 9	20 6	20 6	87 0	67 2	74 8
October.....	7 5	7 6	7 0	5 9	20 6	20 6	91 2	70 8	68 3
November.....	7 6	6 9	7 3	6 6	20 6	20 6	106 8	68 7	79 1
December.....	7 6	—	7 3	—	20 6	20 6	104 3	61 7	69 6
1946—									
January.....	7 6	—	8 1	5 9	20 6	20 6	103 4	68 6	75 4
February.....	6 0	5 10	8 1	5 9	20 6	20 6	90 8	69 3	69 4
March.....	6 2	5 3	7 4	5 4	20 6	20 6	86 8	61 11	63 7
April.....	7 0	5 6	7 4	4 11	20 6	20 6	91 4	51 0	74 3
May.....	6 10	5 1	7 6	4 6	69 11	69 11	90 6	52 11	75 7
June.....	7 3	5 6	7 6	4 5	60 8	60 8	84 2	45 9	66 1
July.....	7 5	6 9	7 3	4 5	57 10	57 10	81 8	45 1	67 7
Augst.....	7 5	4 8	—	4 3	48 5	48 5	69 11	41 1	61 7

(a) Municipal Market.

(b) Seasonal year for kaffircorn,
1 June-31 May.

Dry Beans, 1 April-31 March;

Lucerne and teff, 1 July-30
June.

Prices of Avocados and Papaws on Municipal Markets.

SEASON.	AVOCADOS (Per Tray). (a)				PAPAWS. (b)						
	Cape Town.	Durban.	Johannesburg.		Cape Town Std. Box.	Durban. Tray.	Johannesburg.		Port Eliza- beth Std. Box.	Bloem- fontein Std. Bpx.	
			Ordinary.	N.M.			Ordinary Std. Box.	N.M. Std. Box.			
1938-39.....	s. d. 1 6	s. d. 0 11	s. d. 1 3	s. d. 1 11	s. d. 2 0	s. d. 0 10	s. d. 1 7	s. d. 2 0	s. d. 2 0	s. d. 1 8	
1939-40.....	2 1	1 2	1 9	2 11	2 3	0 10	1 4	1 9	1 11	1 6	
1940-41.....	1 10	0 10	1 5	2 4	2 1	1 1	1 9	2 2	2 3	1 9	
1941-42.....	2 4	1 7	2 1	3 4	2 5	0 10	1 10	2 1	1 11	2 0	
1942-43.....	3 1	1 8	2 10	4 3	3 2	1 2	2 1	2 7	2 2	2 0	
1943-44.....	4 1	1 6	3 7	5 3	3 2	1 5	2 5	3 5	3 3	2 7	
1944-45.....	—	—	—	—	3 4	1 6	3 1	4 1	3 5	3 0	
1945—											
January.....	3 11	—	4 10	7 2	3 10	1 5	4 1	4 9	6 5	3 6	
February.....	2 0	2 3	2 6	4 3	2 8	1 10	5 11	7 6	—	5 5	
March.....	2 0	0 11	2 3	4 4	4 10	1 10	5 4	6 9	—	4 10	
April.....	1 10	0 10	2 7	3 11	4 9	1 8	4 5	6 2	4 11	4 6	
May.....	2 4	0 9	2 5	4 3	4 7	1 6	3 7	5 0	4 7	2 11	
June.....	2 4	2 5	2 10	6 1	4 4	1 11	3 7	4 6	4 0	3 6	
July.....	3 4	2 4	3 10	5 8	4 2	1 9	4 10	5 9	4 11	5 0	
August.....	6 8	3 10	6 2	7 4	5 10	1 5	4 10	6 1	5 3	5 0	
September.....	5 4	3 1	6 5	7 0	3 3	1 4	3 3	4 1	2 7	3 6	
October.....	7 2	3 8	8 1	7 4	2 7	1 5	2 5	3 5	2 2	2 4	
November.....	9 5	3 6	6 6	8 0	3 6	2 0	2 7	3 7	6 7	3 2	
December.....	7 8	1 0	7 1	—	4 4	1 0	3 11	5 7	5 10	3 6	
1946—											
January.....	8 1	1 8	5 10	9 2	3 10	1 6	4 5	7 11	6 4	3 11	
February.....	3 4	0 10	3 1	5 0	2 10	1 5	7 1	5 6	5 6	4 7	
March.....	2 11	3 7	2 3	4 0	—	1 1	6 6	7 8	6 4	5 8	
April.....	2 8	1 11	3 4	4 9	5 5	1 1	5 6	7 11	6 3	4 6	
May.....	3 0	1 10	3 7	5 5	5 1	1 1	4 9	5 8	4 7	4 2	
June.....	3 6	2 3	4 5	6 4	3 8	2 5	4 10	5 9	5 2	4 0	
July.....	4 1	1 9	5 6	6 3	4 11	2 7	5 4	6 0	6 3	4 11	
August.....	5 7	5 1	5 10	6 8	5 1	2 6	4 4	5 1	4 9	4 4	

(a) Season 1 January to 31 December.

(b) Season 1 April to 31 March.

CROPS AND MARKETS.

Average Prices of Eggs and Poultry on Municipal Markets.

SEASON (1 July to 30 June).	EGGS.			FOWLS (Live, each).			TURKEY COCKS (Live, each).		
	Johannes- burg, New- laid. Per Dozen.	Durban, New- laid. Per Dozen.	Cape Town. Per 100.	Johannes- burg.	Durban.	Cape Town.	Johannes- burg.	Durban.	Cape Town.
1938-39.....	s. d. 1 0	s. d. 1 1	s. d. 7 11	s. d. 2 6	s. d. 2 4	s. d. 2 7	s. d. 10 7	s. d. 12 7	s. d. 10 3
1939-40.....	0 11	1 3	7 4	2 6	2 5	2 5	10 2	12 5	9 3
1940-41.....	1 1	1 3	8 3	2 11	2 10	3 0	8 5	12 0	9 8
1941-42.....	1 6	1 9	10 7	3 5	3 4	3 7	12 10	16 2	14 4
1942-43.....	1 10	2 0	13 5	4 6	4 2	4 8	16 3	16 10	15 0
1943-44.....	2 1	2 2	14 2	5 3	5 3	5 6	16 7	20 6	15 8
1944-45.....	1 11	—	14 10	5 1	5 6	5 9	16 8	18 5	18 7
1945—									
January.....	2 3	2 2	17 10	4 5	5 2	5 6	12 8*	17 8	17 0
February.....	2 6	2 6	19 10	4 7	5 5	5 6	12 0	21 2	15 11
March.....	2 9	2 10	20 5	4 8	5 6	5 7	12 9	12 4	15 6
April.....	3 2	3 2	22 7	5 1	5 10	5 5	13 0	13 1	15 1
May.....	3 3	3 8	26 0	5 4	4 11	5 4	13 10	14 9	15 1
June.....	3 2	3 5	25 11	5 11	6 1	5 11	13 0	16 7	21 1
July.....	1 10†	2 0	16 5	6 4	6 6	6 2	17 5	15 10	19 5
August.....	1 7	1 6	11 11	6 1	6 8	6 0	18 4	18 9	22 2
September.....	1 5	1 5	11 0	5 6	6 3	6 1	17 10	19 7	24 8
October.....	1 6	1 7	10 11	4 8	5 11	5 8	17 3	20 5	13 8
November.....	1 7	1 8	11 7	4 4	5 5	5 7	15 6	20 1	23 6
December.....	2 0	2 2	14 1	4 5	5 4	5 5	14 0	17 7	—
1946—									
January.....	2 4	2 7	18 3	4 6	5 5	5 6	14 1	14 8	—
February.....	2 8	2 10	20 11	4 3	5 5	5 4	12 0	15 10	—
March.....	3 0	3 2	21 6	4 7	5 9	5 8	12 4	14 3	—
April.....	3 6	3 9	27 2	5 1	5 7	5 6	12 5	12 9	—
May.....	3 6	3 10	28 6	5 8	5 9	5 3	13 9	18 0	—
June.....	2 11	3 2	26 9	6 2	5 11	5 8	15 9	15 6	—
July.....	1 11	2 1	16 2	6 5	6 1	6 1	17 1	17 8	—
August.....	1 7	1 7	12 5	6 4	6 1	6 4	19 2	18 7	—

* Prices of Turkeys: Live, each.

† Large, Grade 1.

Prices of Bananas and Pineapples on Municipal Markets.

SEASON.	BANANAS (Per Crate) (a)			PINEAPPLES. (b)						
	Cape Town.	Johan- nesburg.	Pretoria.	Cape Town. Box.	Durban. Doz.	Johannesburg. Ordinary. Doz.	Queens and Giants. Doz.	Port Elizabeth. Box.	East London. Doz. Large.	Bloem- fontein. Bushel Box.
1938-39.....	s. d. 22 5	s. d. 9 10	s. d. 16 5	s. d. 5 4	s. d. 3 3	s. d. 1 1	s. d. —	s. d. 3 5	s. d. 1 2	s. d. 4 10
1939-40.....	24 4	8 7	15 10	6 1	3 10	1 4	4 8	3 10	1 5	4 9
1940-41.....	27 0	7 2	14 3	5 10	2 8	1 5	2 1	4 5	1 5	5 10
1941-42.....	28 6	7 6	14 6	6 6	3 0	1 7	2 5	4 6	1 8	6 2
1942-43.....	30 0	11 9	22 7	7 4	3 0	1 8	3 10	4 11	2 1	7 3
1943-44.....	37 8	13 2	13 10	8 3	3 6	2 4	2 1	6 8	2 10	8 4
1944-45.....	—	—	—	10 4	3 9	2 6	3 9	7 3	3 3	8 6
1945—										
January.....	31 9	12 11	14 0	7 7	—	1 4	2 2	6 3	2 4	6 3
February.....	32 8	13 5	16 7	5 11	—	1 5	1 3	5 4	2 7	6 11
March.....	27 1	13 7	14 8	6 3	—	1 7	2 5	4 11	4 7	5 6
April.....	34 11	14 10	17 4	7 4	—	2 2	3 5	5 9	3 11	6 4
May.....	30 11	10 3	13 7	8 4	2 9	3 5	2 10	9 4	2 7	8 2
June.....	31 5	9 4	12 6	8 10	2 7	5 4	5 9	10 9	4 4	8 6
July.....	33 11	10 6	19 4	13 2	2 5	7 1	5 6	17 7	3 5	15 3
August.....	38 1	16 1	16 4	12 9	4 1	5 4	5 9	13 8	3 3	13 11
September.....	53 7	20 3	13 1	11 7	8 3	5 9	6 2	10 4	5 0	15 8
October.....	70 8	41 1	33 4	13 1	10 7	7 6	5 8	16 0	4 6	14 1
November.....	68 0	32 4	25 1	10 10	10 9	4 5	5 0	12 4	4 10	13 6
December.....	75 11	17 7	11 1	10 7	7 4	3 4	4 6	7 7	5 9	8 5
1946—										
January.....	31 9	14 4	14 11	10 4	3 0	3 5	3 4	8 7	2 9	9 3
February.....	54 3	12 0	13 8	8 4	2 9	2 8	4 0	8 5	4 6	9 7
March.....	69 7	17 3	23 6	9 10	5 9	3 8	3 8	7 1	6 7	11 6
April.....	75 5	29 5	17 7	11 8	5 7	4 0	5 4	9 5	2 7	9 4
May.....	76 8	29 8	22 2	7 6	4 6	3 4	3 6	8 3	3 10	8 7
June.....	77 11	23 5	26 7	10 7	5 0	4 7	4 7	7 5	6 3	12 3
July.....	60 11	25 4	25 8	15 7	3 2	9 3	10 3	15 5	5 7	13 5
August.....	72 1	23 9	31 5	19 10	4 10	7 11	9 7	16 10	4 7	13 10

(a) Season 1 January to 31 December.

(b) Season 1 October to 30 September.

Average Prices of Onions and Sweet Potatoes on Municipal Markets.

SEASON (1 July to 30 June)	ONIONS (120 lb.).						Sweet Potatoes. (120 lb.).		
	Johannesburg.		Cape Town.	Pretoria.	Durban.		Table.		
	Transvaal.	Cape.	Cape.	Cape.	Local.	Cape.			
1938-39.....	s. d. 8 3	s. d. 8 10	s. d. 7 4	s. d. 7 10	s. d. 8 6	s. d. 9 6	s. d. 5 7	s. d. 4 8	s. d. 5 3
1939-40.....	6 3	9 10	7 3	9 11	9 8	10 5	5 7	5 9	5 0
1940-41.....	12 5	12 3	9 10	11 11	11 2	12 7	7 3	6 4	5 5
1941-42.....	10 5	13 11	10 4	13 10	13 0	14 3	9 10	7 1	8 4
1942-43.....	13 8	14 0	12 6	14 7	12 9	14 5	9 8	8 1	8 5
1943-44.....	16 2	18 9	15 1	17 4	19 1	19 2	12 0	10 0	10 7
1944-45.....	14 7	18 7	14 8	18 1	18 8	19 5	17 3	15 1	16 3
1945—									
January.....	12 9	13 1	9 11	14 8	12 3	13 5	18 2	7 8	14 7
February.....	13 5	13 10	9 9	10 4	12 2	14 0	16 0	8 1	10 8
March.....	13 10	15 2	11 4	14 9	18 9	17 0	12 6	9 6	12 5
April.....	17 8	17 5	14 6	16 9	12 6	17 8	9 11	7 5	9 1
May.....	16 4	17 11	12 0	18 0	19 11	20 10	10 4	7 1	11 4
June.....	20 8	17 11	14 4	18 4	15 4	18 1	9 4	8 2	9 4
July.....	16 7	18 7	15 5	16 8	17 7	20 5	10 4	8 8	12 4
August.....	18 7	18 4	15 7	18 3	16 9	19 4	11 3	8 9	12 1
September.....	16 1	17 7	16 1	19 11	19 3	20 5	15 0	12 11	14 2
October.....	10 8	14 5	12 11	14 8	10 4	15 10	10 0	15 6	17 0
November.....	12 3	9 3	13 0	—	14 3	13 10	19 11	19 1	21 2
December.....	14 8	15 3	15 6	17 10	16 11	15 7	17 1	14 6	17 7
1946—									
January.....	12 0	12 1	9 7	—	11 7	13 0	17 1	15 6	17 3
February.....	12 3	13 8	11 1	13 1	15 2	9 11	17 3	10 3	17 2
March.....	11 4	12 4	9 9	12 10	12 9	13 5	18 5	14 8	14 8
April.....	12 1	12 10	11 3	13 10	15 1	14 9	15 2	17 4	14 7
May.....	13 6	13 9	11 9	13 9	12 10	14 7	15 8	15 6	14 5
June.....	14 7	15 5	12 2	17 1	15 11	14 11	14 11	14 8	15 1
July.....	11 10	14 3	12 0	15 0	15 2	15 6	15 2	15 2	17 4
August.....	14 9	17 0	13 7	15 10	20 6	18 7	16 10	16 0	18 3

Average Prices of Green Beans, Green Peas and Carrots on Municipal Markets.

SEASON (1 July to 30 June.)	GREEN BEANS (Pocket 20 lb.).			GREEN PEAS (Pocket 20 lb.).			CARROTS (Bag). (a).		
	Johannesburg.	Cape Town.	Durban.	Johannesburg.	Cape Town.	Durban.	Johannesburg.	Cape Town.	Durban.
1938-39.....	s. d. 1 8	s. d. 2 3	s. d. 2 0	s. d. 2 4	s. d. 1 9	s. d. 1 2	s. d. 3 8	s. d. 2 6	s. d. 6 1
1940-41.....	1 11	2 9	1 5	2 8	2 4	2 3	5 9	4 11	13 4
1941-42.....	2 7	3 10	2 6	3 11	3 3	3 4	8 5	8 11	17 2
1942-43.....	3 1	4 3	3 0	3 3	2 10	3 9	5 1	8 9	13 2
1943-44.....	3 8	4 11	3 0	4 11	4 10	4 11	9 11	11 1	20 2
1944-45.....	3 7	5 1	4 1	4 9	4 1	5 5	8 3	9 11	19 10
1945—									
January.....	1 10	0 11	2 4	4 3	1 9	6 7	7 7	3 1	10 2
February.....	1 7	3 4	2 3	5 5	6 9	7 4	7 8	6 11	19 1
March.....	2 3	4 11	2 6	7 7	12 0	7 7	9 5	6 3	25 4
April.....	1 11	2 8	1 10	4 4	6 6	4 0	8 6	13 9	19 6
May.....	3 3	5 3	2 3	5 9	9 11	3 1	9 5	8 7	21 6
June.....	4 3	4 2	5 0	4 9	7 9	3 8	10 0	10 10	13 9
July.....	9 10	7 10	5 10	8 2	11 7	8 8	10 1	16 4	20 11
August.....	7 4	6 4	6 10	5 8	7 10	5 5	13 4	17 11	12 11
September.....	3 1	5 9	4 1	2 8	4 1	2 4	7 5	12 18	16 8
October.....	3 8	5 4	4 9	4 4	3 6	7 7	9 6	9 10	20 11
November.....	1 6	3 4	2 4	0 0	4 0	9 4	9 8	8 8	16 4
December.....	2 4	2 3	2 8	12 1	—	12 5	10 9	7 10	13 10
1946—									
January.....	3 4	1 11	5 6	8 8	10 11	14 7	9 8	6 2	16 0
February.....	1 11	—	2 3	6 5	—	6 4	7 3	7 11	14 1
March.....	2 10	1 1	2 5	6 1	—	3 4	8 10	8 1	23 10
April.....	2 7	3 4	3 1	5 7	—	4 10	10 2	9 3	24 2
May.....	1 9	3 0	2 2	7 2	3 10	5 10	7 1	6 3	18 8
June.....	1 10	2 0	2 8	4 8	4 1	5 7	4 2	7 6	11 7
July.....	8 2	1 11	2 2	2 7	3 6	3 4	8 8	4 8	7 10
August.....	6 3	4 2	6 6	5 10	5 0	4 9	4 5	3 8	11 0

(a) Weights of bags vary, but on the average are approximately as follows:—Johannesburg, 130 lb.; Cape Town, 90 lb.; and Durban, 120 lb.

CROPS AND MARKETS.

Index of Prices of Field Crops and Animal Products. (Basic period 1936-37 to 1938-39 = 100.)

SEASON (1 July to 30 June).	Summer cereals.	Winter cereals.	Hay.	Other field crops.	Pastoral products.	Dairy products.	Slaughter stock.	Poultry and poultry products.	Com- bined index.
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	
WEIGHTS.	19	13	2	3	34	6	17	6	100
1938-39.....	92	107	96	89	79	102	106	92	93
1939-40.....	86	107	77	95	115	105	106	89	103
1940-41.....	109	113	106	156	102	108	110	104	108
1941-42.....	121	134	143	203	102	131	134	145	123
1942-43.....	160	149	144	159	122	147	167	173	146
1943-44.....	169	172	137	212	122	154	182	204	157
1944-45.....	184	183	100	280	122	177	172	187	103
1945—									
January.....	184	183	177	250	122	159	173	206	163
February.....	184	183	171	235	122	180	171	225	164
March.....	184	183	182	245	122	180	171	237	165
April.....	184	183	173	246	122	180	169	233	166
May.....	199	183	173	257	122	184	163	272	170
June.....	199	183	190	320	123	184	170	262	172
July.....	199	183	191	315	118	210	175	210	170
August.....	199	183	191	333	118	210	179	180	169
September.....	199	183	187	372	118	210	183	165	170
October.....	199	183	189	383	118	210	187	165	171
November.....	199	190	194	379	118	204	187	173	172
December.....	199	190	194	341	117	204	183	202	172
1946—									
January.....	199	190	191	349	118	204	179	233	174
February.....	199	190	158	308	118	186	175	256	171
March.....	199	190	180	283	118	186	171	277	171
April.....	199	190	176	299	118	186	168	320	174
May.....	250	190	170	286	110	186	165	332	184
June.....	247	190	178	285	119	218	164	295	183
July.....	246	190	182	306	120	231	170	218	181
August.....	243	190	181	324	120	231	175	183	180

(a) Maize and kaffircorn.
(b) Wheat, oats and rye.
(c) Lucerne and teff hay.

(d) Potatoes, sweet potatoes,
onions and dried beans.
(e) Wool, mohair, hides and skins.

(f) Butterfat, cheese milk and
condensing milk.
(g) Cattle, sheep and pigs.
(h) Fowls, turkeys and eggs.

Average Prices of Cabbages, Cauliflower and Tomatoes on Municipal Markets.

SEASON (1 July to 30 June).	CABBAGES (Bag). (a)			CAULIFLOWER (Bag). (a)			TOMATOES (Trays 15 lb.).			
	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.	Johannesburg.			
							N.M. No. 1.	Other.	Cape Town.	Durban.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1938-39.....	3 10	3 0	3 10	3 0	1 8	3 5	2 2	1 3	1 8	0 10
1940-41.....	5 10	4 8	7 1	3 11	4 3	5 3	2 7	1 6	2 1	1 2
1941-42.....	8 10	5 5	11 5	5 9	5 7	7 11	3 1	1 9	2 3	1 6
1942-43.....	5 6	5 11	9 1	5 0	5 9	7 6	3 4	1 10	2 1	2 7
1943-44.....	11 1	7 4	17 6	9 2	6 2	12 1	5 5	2 9	3 7	2 0
1944-45.....	9 7	6 11	13 5	7 5	6 6	9 8	4 1	2 0	2 8	1 9
1945—										
January.....	8 0	4 9	15 8	6 3	—	—	6 1	2 6	2 7	2 2
February.....	7 8	8 6	22 4	9 5	6 11	—	3 0	1 2	3 1	1 1
March.....	8 5	10 5	24 1	8 8	—	8 0	3 4	1 5	2 6	2 4
April.....	8 7	7 11	14 8	7 7	9 7	11 4	3 4	1 5	2 6	1 7
May.....	7 6	5 4	11 2	7 3	6 5	10 10	4 0	1 10	2 4	1 10
June.....	8 11	4 3	10 6	11 7	7 7	14 10	3 11	2 1	3 0	1 1
July.....	12 2	5 4	11 0	12 3	5 7	11 0	3 7	1 10	2 9	1 2
August.....	12 0	9 7	8 11	10 0	8 2	12 3	5 2	3 2	3 4	1 5
September.....	12 2	11 7	10 8	11 8	9 6	14 10	6 7	3 1	3 10	1 10
October.....	10 1	12 1	16 3	17 0	5 9	11 0	6 2	2 8	3 1	1 8
November.....	10 9	9 11	16 0	12 9	8 6	—	5 7	2 8	4 0	1 6
December.....	14 2	9 10	17 7	26 0	3 6	—	3 0	1 1	3 11	1 1
1946—										
January.....	9 7	8 0	14 8	14 5	9 0	—	4 3	1 10	2 5	1 3
February.....	7 3	9 1	18 1	10 10	6 6	—	4 2	1 7	1 11	1 3
March.....	8 11	7 3	14 4	7 2	9 8	3 4	6 2	3 8	2 6	1 6
April.....	9 10	5 8	9 0	6 7	15 4	12 4	8 1	3 6	2 8	2 0
May.....	8 4	3 4	7 7	7 2	5 3	8 11	6 3	2 11	3 8	2 3
June.....	5 10	2 4	11 0	7 7	3 1	12 1	4 2	2 0	2 10	1 5
July.....	7 11	1 10	9 9	8 6	—	11 3	2 2	1 1	2 3	1 0
August.....	5 8	2 1	7 1	8 0	3 2	11 1	2 5	1 3	1 11	0 9

(a) Weights of bags vary, but on the average are approximately as follows: For cabbages—Johannesburg, 150 lb.; Cape Town, 105 lb.; and Durban, 90 lb. For cauliflower—Johannesburg, 100 lb.; Cape Town, 65 lb. and Durban, 85 lb.

CONTENTS



	PAGE
EDITORIAL:	
Produce More Groundnuts	719
Better Seed for Larger Yields	720
SPECIAL:	
Prices of Agricultural Land still Rising (Dr F. R. Tomlinson)	722
ANIMAL HUSBANDRY:	
Balanced Rations: A simple method for the compounding of Rations (Drs. J. W. Groenewald and G. B. Laurence)	727
Diplomas for Life Performances of Registered Cows (H. J. Steenberg)	746
The Horse on the Farm.—III. Rudiments of Equitation (Dr. P. J. Schreuder and F. B. Wright)	749
The Breeding Value of Friesland Bulls in South Africa.—IV. (Dr. F. N. Bonsma)	773
FIELD HUSBANDRY:	
Grasses for Controlling Soil Erosion (S. A. Degenaar)	725
Requirements for a Good System of Rotational Cropping (J. J. du Toit)	743
Preliminary Investigations on the Black Spot Disease of Citrus (Dr. V. A. Wager)	770
Sales of Eight Vegetable Varieties on Eight most Important Municipal Markets in the Union (A. J. du Plessis)	783
POULTRY FARMING:	
Classing of Poultry or Culling of Non-Producers.—II. (P. J. Serfontein)	735
MISCELLANEOUS:	
Agricultural Engineering.—II. Elementary Land Measuring (E. A. Oosthuizen)	761
Millepedes or Thousand-Legs (E. E. Anderssen)	780
Nursery Quarantines	734
CROPS AND MARKETS	781

[NOTE.—Articles from *Farming in South Africa* may be published provided acknowledgment of source is given.]

FORD'S FOR SEEDS—A. FORD & Co. (Pty.) Ltd.

AGRICULTURAL SEEDSMEN.

SEED CONTRACTORS TO THE UNION GOVERNMENT,

P.O. BOX 5701.

CATALOGUES FREE

JOHANNESBURG.

Information on Departmental Publications.

Farming in South Africa, the monthly journal of the Department, contains popular as well as scientific articles on a variety of agricultural topics, useful to both the farmer and the housewife, while the **Crops and Markets** Section supplies information on crop prospects, market prices and exports of agricultural produce.

The following particulars in regard to subscriptions and advertisements should be noted :—

Subscription.—Within the Union, South West Africa, Bechuanaland Protectorate, Southern Rhodesia, Swaziland, Basutoland, Mocambique, Angola, Belgian Congo, and British Territories in Africa, 5s. (otherwise 7s. 6d.) per annum, post free, payable in advance.

Applications, with subscriptions, to be sent to the Government Printer, Bosman Street, Pretoria.

Advertisements.—*The Tariff for Classified Advertisements is:* 2d. (two pence) a word with a minimum of 5s. per advertisement (prepaid). Repeats, not entailing any change in the wording, will be published at half the cost of the original.

Conditions:—

- (1) The advertisement will be classified under specific headings, and only one black letter (initial letter) is permitted.
- (2) Advertisements in which prices are mentioned must contain the name and address of the advertiser. A nom-de-plume or box number only is not sufficient, and unless this condition is strictly observed, advertisements will not be accepted.
- (3) Advertisements will be classified strictly in accordance with the subject-matter of the announcement, determined by the first item mentioned and cannot be inserted under irrelevant headings.
- (4) Displayed, classified advertisements will also be accepted. The charge, however, will be 10s. per inch, single column, per insertion, without reduction for repeats.

Copy for Advertisements to be in the hands of the Government Printer, Pretoria, not later than the 20th of the month preceding publication.

Send all advertisements direct to the Government Printer, or write to him for details as to tariff for advertisements.

Popular Bulletins.—Bulletins on various agricultural topics are published by the Department to meet public demand. A list of available bulletins giving particulars of cost, etc., is obtainable free of charge from the Editor, Department of Agriculture, Pretoria.

Scientific Publications.—From time to time the different Divisions of the Department issue science bulletins incorporating the results of research work conducted by them. Other scientific publications issued are: "The Onderstepoort Journal", "Memoirs of the Botanical Survey of South Africa", "Bothalia", "Entomological Memoirs" and the "Annual Reports of the Low Temperature Research Institute". Information in regard to these publications is obtainable from the Editor, Department of Agriculture, Pretoria.

Press Service.—The Press of South Africa is now supplied with a bulletin of agricultural information for their exclusive use. This information is published fortnightly by all newspapers and other journals throughout the country.

Farmers' Radio Service.—In addition to the printed information supplied by the Department to members of the farming community, the Department, in collaboration with the South African Broadcasting Corporation, also maintains a daily broadcasting service to farmers. Information in regard to times of broadcasting is contained in the programmes issued by the Broadcasting Corporation.

Inquiries.—All general inquiries in regard to the publications of the Department, including the Radio Service, should be addressed to the Editor, Department of Agriculture, Pretoria.

D. J. SEYMORE, Editor.

FARMING IN SOUTH ... AFRICA

VOL. 21

NOVEMBER 1946

No. 248

Editorial:

Produce More Groundnuts.

TWO-DAY vegetable oils and fats play an important rôle in national economy.

The oil cake which remains after the oil has been expressed from the oil-bearing seeds, has become indispensable in the feeding of stock. When processed, the oil cake may even be used by man. In the Union the demand for oil and oil cake has given rise to an industry which, since 1939, has consumed an average of 40,000 tons of groundnuts alone per year. Considerable quantities of cotton seed, sesame and sunflower seed have also been used apart from the large quantities of palm kennels and copra, used mainly in the manufacture of soap oils.

Owing to the fact that the Union has produced, at the most, 10,000 tons of groundnuts annually, practically all of which was used for human consumption, these requirements of the oil industry had to be obtained from the East and from certain African territories.

The renewed high demand from the oil factories in Europe, the famine in India and the development of oil industries in countries where the most important oil-bearing seeds are produced, are the main reasons why the Union is experiencing such difficulty in keeping its oil factories going. Producing countries are showing a growing preference for the export of oil instead of oil-bearing seeds and oil cake. It is not likely that this state of affairs will improve for a number of years. Consequently, like various other countries, the Union has undertaken the production of more oil-bearing seeds. Provisionally 20,000 bags of shelled groundnuts have been set aside for seed. This represents approximately twice the amount of seed planted annually in the past. In addition, 5,000 tons of fertilizer have been allotted for the cultivation of the crop. More than enough seed disinfectants are available to prevent the serious waste which accompanies the planting of untreated seed.

New areas must come to the aid of the old established groundnut-production areas. The attempts made during the past four years to increase the plantings, showed that the north-western Orange Free State, Natal, and the irrigation areas will be able to meet these requirements. For the greater part, this crop thrives in these areas and fits in well with the current system of farming.

It is essential that groundnuts should be shelled in the producing areas where possible, since the factories have no shelling facilities, and the railage on unshelled groundnuts is high and uneconomical. Simple shelling machines are necessary and are already being made in this country. In order to cope with labour difficulties, prevent waste of valuable hay and the spread of nut-rot, greater use will have to be made of groundnut harvesting machines. Fortunately, such machines are not difficult to obtain.

To meet the country's groundnut requirements, five to six times as much land will have to be planted to this crop. Since the seed supply and the shortage of equipment imposes certain restrictions, the first aim is to double the crop, which is certainly not impossible. It is even possible to expand production on a scale which will make possible the export of groundnut products.

Better Seed for Larger Yields.

THE yield per morgen of land or per bag of seed sown in the Union, is far below that of most oversea countries. As a rule, this is ascribed to poor soil fertility, erratic rainfall, weeds and ineffective soil cultivation, but the biggest reason why this country lags behind in production, namely, the poor quality of our seed and planting material, is overlooked.

In general, farmers are not yet sufficiently "seed-conscious", i.e. they are not sufficiently meticulous as regards the quality, viability, purity and yielding capacity of the seed which they buy. Hardly any demands are made of the seed merchant as regards these vital requirements of good seed.

Most South African seed suppliers lack the necessary background of agricultural science to be able to produce their own agricultural seed along scientific lines.

In so far as agricultural crops are concerned it must unfortunately be emphasized that private undertakings have made practically no tangible contributions to the improvement of our crops.

Seedsmen do, it is true, provide sowing material on a large scale but by no stretch of imagination can this material be called improved or tested seed. All too often—and unfortunately most of our producers do not object—what is offered as seed, is merely a portion of the farmer's ordinary crop which has perhaps grown a little better than the rest; or else the farmer's crop is bought and graded, and the best and most uniform seeds kept and sold, without any further knowledge of their history.

This method falls short in that (1) selection, which is the basis of improvement in the broader sense, is never practised, (2) the habits of growth of the plant are not taken into account, and (3) no attention is paid to the plant's resistance or susceptibility to disease or to its adaptability in any given area. As a rule nothing is known about the yielding capacity either. The outward appearance of the seed is the only criterion used.

Proper provision of seed by any seedsman must necessarily be undertaken on a scientific basis. Accurate plant selections on the land, comparative yields, experiments with the seed or seed plots, the application and practice of genetics for obtaining new types by the crossing of desirable types, and the adaptability of new types to various areas of the country, where they will yield the largest crops—all these require the closest attention of any undertaking which aims at supplying seed of the highest quality and productivity to the farmer.

Unfortunately for the grain farmer no such enterprises exist in the Union as yet. The seed industry in this country still relies mainly on the experience and observations of the farmer as regards the suitability, productivity and adaptability of types in various areas. It is therefore clear that this method is ineffective. Every seed producer must be a connoisseur; he must be acquainted with the specific requirements of every area and should organize his business on a genuinely scientific basis which will enable him to supply the correct type of seed.

Up to the present the Department of Agriculture has itself undertaken the production of new types of seed and has tested out their adaptability in various areas. The Department has already provided the agricultural industry with a number of new types, such as maize, wheat, oats, kaffir corn, cowpeas, soybeans, tobacco, cotton; etc., and it is its intention to continue in this direction, although it must be admitted that it cannot continue to provide farmers with planting material on a large scale. The agricultural industry will profit considerably if departmental research workers are given the opportunity of concentrating on basic research, since private undertakings are, as a rule, unable to do so.

The time has undoubtedly come for South African seed suppliers to follow the example of other countries and undertake their own improvement work, offer their own tested types of seed for various purposes and give their own guarantees.

We cannot expect seed of a consistently high quality to be supplied for the farmer unless seed-supplying enterprises in the Union are put on a truly scientific basis. Only then will our yields per morgen increase considerably. New and existing agricultural organizations can do much towards placing seed production on such a basis and thus placing agriculture, as a whole, on a sounder footing.

By the use of good seed, by good cultivation, fertilization and weed control, the average yield in the Union can at least be doubled.

The production of better seed for the agricultural industry is undoubtedly one of the greatest problems awaiting a solution and, in the interest of national nutrition, should be tackled without any delay.

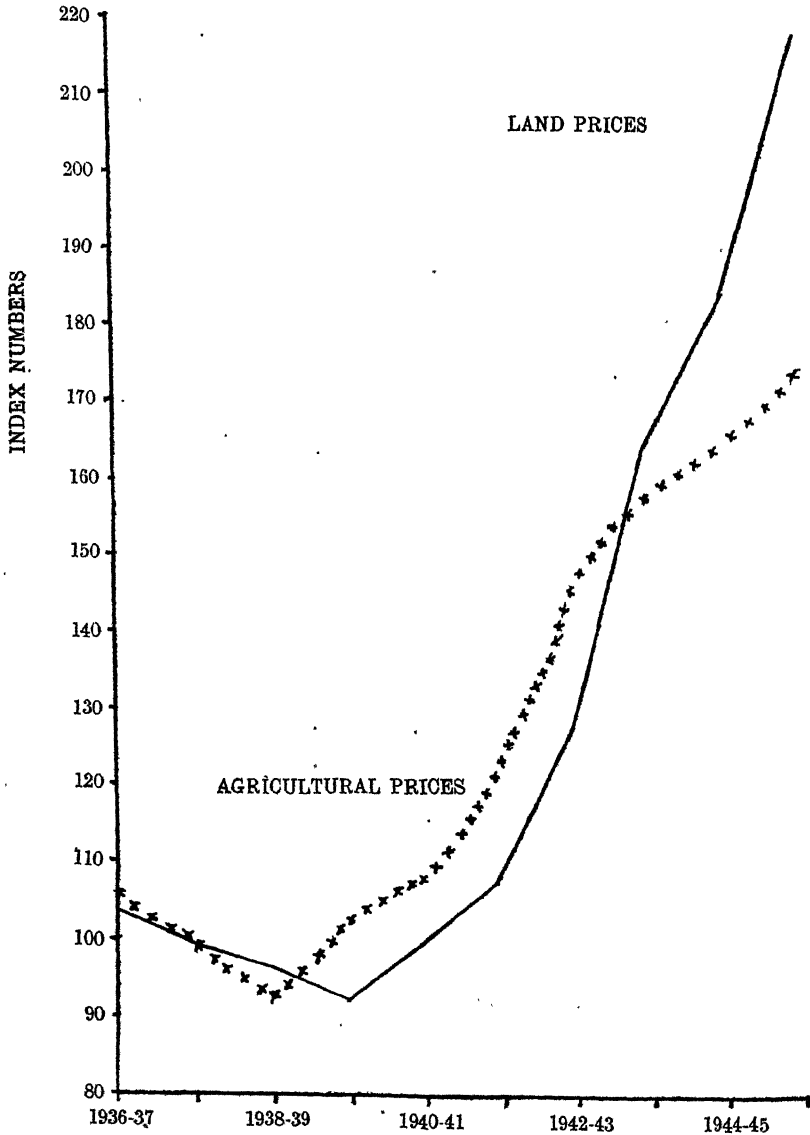
Levelling Outfits for Farmers.

In order that farmers may help themselves in the surveying of anti-erosion works, the Director of Soil Conservation and Extension has made arrangements for the local manufacture and sale of reliable, but cheap instruments. The outfit consists of a telescopic dumpy level with tripod, levelling staff and instructions. It will be obtainable from the Division of Soil Conservation and Extension, P.O. Box 965, Pretoria, against a remittance of £10, accompanied by a certificate from the local Magistrate or Extension Officer, indicating that the applicant is a *bona fide* farmer.

Prices of Agricultural Land Still Rising.

Dr. F. R. Tomlinson, Agricultural Research Institute, Pretoria.

ALTHOUGH the war ended more than a year ago, there is still no indication of a downward turn in the prices of agricultural land. The trend is still upward.



Index numbers of agricultural land values and prices of agricultural products, 1936-37 to 1945-46. (1936-37 to 1938-39 = 100).

The accompanying graph shows the prices of agricultural land from 1936-37 to 1945-46 on the basis of the average values which

PRICES OF AGRICULTURAL LAND STILL RISING.

ruled during the years 1936-37 to 1938-39. The indexes of agricultural prices are also shown during the same period for comparative purposes.

Agricultural land values for the Union as a whole have more than doubled since the pre-war basic years. In 1945-46 the index stood at 213, i.e., 113 per cent. above the pre-war average. Prices of agricultural products also increased strongly during the war period, but the trend was not as sharp during the past three years as from 1938-39 to 1943-44. Land values therefore increased more rapidly than agricultural prices during the past few years. Generally it can be stated, however, that these two price series move together in strong harmony.

When will the Turning Point Come?

The question is often asked when the turning point in agricultural land values will make its appearance. It will be no easy task to make a correct forecast on this matter because the price of agricultural land is a reflection of various economic conditions. Prices of agricultural products, prices of agricultural requirements, surplus capital inside and outside agriculture seeking investment, general optimism regarding the present boom period, and various other factors are all concerned in this problem. There still appears to be plentiful surplus capital seeking investment and there is still no indication of a turning point in the general profitability of agriculture. Consequently, optimism is still at a high-water level. The result is that no turning point can as yet be noticed in the prices paid for agricultural land.

Sales Turn-over.

It appears that the turn-over in farm land has already reached its peak, in spite of the fact that the average price of land is still increasing. The maximum area of 9,224,000 morgen was sold in 1943-44, while this figure declined to 6,280,000 morgen in 1945-46. The total value of farm land reached a peak of £30,688,000, also in 1943-44, whereas it declined to £27,243,000 during the past year (see Table 1). Since April 1940 and up to March 1946 the colossal amount of £140,000,000 was paid for agricultural land. Unfortunately it is impossible to state what percentage of the land sold during these years changed hands more than once.

TABLE 1.—*Sales of Agricultural Land in South Africa,
1936-37 to 1945-46.*

Year.	Area (Morgen).	Total Value. £	Number of Farms.	Average Area (Morgen).
1936-37.....	6,788,000	14,424,000	8,754	775
1937-38.....	7,914,000	15,966,000	9,558	828
1938-39.....	8,052,000	15,810,000	9,350	861
1939-40.....	6,689,000	12,561,000	8,290	807
1940-41.....	6,202,000	12,698,000	8,624	719
1941-42.....	7,630,000	16,661,000	10,298	741
1942-43.....	8,843,000	22,770,000	12,383	714
1943-44.....	9,224,000	30,688,000	14,886	620
1944-45.....	7,973,000	29,516,000	14,513	549
1945-46.....	6,280,000	27,243,000	13,196	476

During the same period there was sold an area equal to about 33 per cent. of the Union's total agricultural area. The farm-land market was therefore very active during the past six years.

The number of farm properties sold annually increased from 8,754 in 1936-37 to the high figure of 14,886 in 1943-44, and since declined to 13,196 in 1945-46. The increase in the number of small farms round large cities is to a certain extent responsible for this increase in the number of farms sold.

During the past ten years the average size of farm sold tended to become much smaller. From an average size of 823 morgen per farm sold in the three pre-war years it declined to a low average of 476 morgen in 1945-46. The average size of farm sold was to some extent influenced by the increase in the number of small farms near cities. In spite of this, however, it can be accepted that considerable sub-division of farms occurred during the past ten years.

Implications.

Although there are still no indications of any turning point in average land values, the above analysis does indicate that the peak has been reached in regard to total area sold, total value, and total number of farms sold. The turn-over is, however, still very high. The abnormal land hunger of the war period is still far from a normal level.

The various trends in the agricultural land market during the past few years are to a large extent a reflection of favourable economic conditions and abnormal optimism, but the fact should not be lost sight of that these trends are also to a certain extent a reflection of development in our agriculture. Large areas which were either unoccupied or unproductively used ten, fifteen years ago became occupied during the war period with the object of using them productively. In such areas the increased land values are not only an indication of inflationary conditions but also to a large extent a reflection of improvements, among others the development of fencing, water supplies, buildings, etc.

As was the case after the first world war, a turning point must also make its appearance after the past war in the present favourable economic situation. Just when the downward trend will start and how low prices will decline, especially prices of agricultural land, cannot be predicted. It can be stated, however, that, as the post-war period advances, the more dangerous it becomes for the buyer of farm land to effect a purchase at present ruling prices. This is especially the case if the purchase is accompanied by a debt. A declining price structure, as can be expected in the future, will create a far more difficult problem in the case of farmers who have to carry a high debt burden than in the case of those who are free of debt or carry a relatively small debt. Therefore make use as much as possible of the present favourable period in order to free yourself of future pressing debt. The breaking point must come sooner or later and it may appear sooner than most people expect.

Grasses for Controlling Soil Erosion.

S. A. Degenaar, Extension Officer, Ermelo.

SLIGHTLY more than a quarter of a mile to the north of the residence of Mr. Jozua Moolman of Kolwanie, near Amsterdam, in the eastern Transvaal, there is a fairly steep slope slashed by a yawning donga—the washed-out road once traversed by the transport waggons of an earlier generation. Fortunately, the stone formation of the slope prevented flood waters from denuding the entire



FIG. 1.—Erosion caused by wagon wheels. Note the sods held down by pegs.

surface, and a donga was formed only on the lowest portion of the road, as illustrated in Fig. 1. The rest of the road, which sloped fairly sharply towards the donga and had been compacted by the waggon wheels, was totally devoid of all vegetation, in spite of the fact that it has not been used for the past quarter of a century.

This donga and barren surface which bore no sign of vegetation, caused Mr. Moolman sleepless nights. The area was fenced off in the hope that natural veld would eventually cover it. After a few years, however, it was found that natural grass would not grow on the denuded portions, and even more discouraging was the fact that if natural grass was left without being burned or cut, many tufts of grass died after the third year.

But Mr. Moolman did not become disheartened. About four years ago he decided to plant three types of grass—Dunn's grass, the procumbent *Acroceras* and Kikuyu grass. These grasses were planted in the donga, holes were made in the hard-baked slope of the road with a crowbar, and roots of these grasses hammered into the soil—just about the worst type of treatment and seed bed for any plant. Mr. Moolman awaited the results of this attempt at

the practically impossible in suspense. After the first season the Kikuyu grass survived only down in the donga where the soil was still damp. There was no sign of it on the hard slope. To his surprise, the other two grasses did not die but made good growth, as can be seen in the foreground of Fig. 2.



FIG. 2.—Grasses spreading to cover the denuded soil again.

Such results must be seen to be believed. It soon appeared, however, that grasses treated in this manner, will take years to cover the barren surface, since the shoots cannot catch up sufficient silt to create more favourable conditions for growth. This gave Mr. Moolman the idea of planting the grass in the form of sods, secured to the soil by means of two wooden pegs, as can clearly be seen in the two photographs. This method proved successful. After the first rains the grasses sprouted rapidly. The seeds of other grasses, carried down in the silt, also took root and these plants are now flourishing, as can be seen in Fig. 2. Encouraged by this undertaking, Mr. Moolman now allows no old footpath or forgotten waggon trail to fall into neglect. A little superphosphate is strewn over the old road, the sods are placed in position and secured, a few branches are placed over them to keep animals away, and Dunn's grass and procumbent *Acroceras* do the rest. The experience of these few years, has shown that Dunn's grass yields better results than *Acroceras*.

Balanced Rations.

A Simple Method for the Compounding of Rations.

Drs. J. W. Groenewald and G. B. Laurence, Research Officers,
Onderstepoort.

IN order to stimulate maximum production and yet conserve the limited available supplies of feed, it has become necessary to consider carefully the balancing of rations for livestock. It will readily be appreciated by all who feed animals, that economical production can be maintained only by feeding an adequately balanced ration, so that all the essential nutrients are supplied in the correct proportions and amounts.

According to Government Regulation No. 1575 of 27 August 1943, all mixtures offered for sale should conform to minimum standards of quality, based on the requirements of various classes of animals. The most important consideration in rations is probably the protein content, and the minimum amounts of protein for various mixtures have been fixed as follows:—

Dairy Meal, 17 per cent.;

Calf Meal—

(a) Calf Starter, 20 per cent.;

(b) Calf Growth, 16 per cent.;

Growth Meal (for young dairy or beef cattle or sheep), 16 per cent.;

Maintenance Meal, 13 per cent.;

Fattening Meal, 13 per cent.;

Pig Meal—

(a) Growth or Brood Sow, 18 per cent.;

(b) Fattening Meal, 14 per cent.;

Poultry—

(a) Chicken Mash, 19 per cent.;

(b) Growing Mash, 17 per cent.;

(c) Laying Mash, 20 per cent.;

(d) Fattening Mash, 13 per cent.;

(e) All Mash, 15 per cent.;

Horse Mixture, 13 per cent.

These minimum protein percentages for mixtures should serve as a guide in preparing home-made mixtures that would adequately meet the requirements of animals.

It must, however, be pointed out that the additional protein required for production rations conforming to the standards can only be obtained by the addition of some form of protein-rich feed such as cake meals or feeds of animal or marine origin. These protein-rich feeds are in short supply, however, and can be obtained only with difficulty. In consequence it is doubtful whether farmers who have not been in the habit of purchasing their requirements of cake meals regularly, will be able to do so during the present critical scarcity. Maximum use will therefore have to be made of home-grown protein feeds in the form of leguminous hay meal such as cowpea, peanut and lucerne hay meals.

Poultry and pigs are unable to utilize fibre to advantage. They benefit particularly when their rations contain a small proportion of

animal or marine protein. Such substances will therefore have to be purchased. Under the present circumstances it may prove advisable to buy ready balanced mixtures, as manufacturers of balanced rations are in a better financial position to import large consignments of proteins. However, farmers should make more serious efforts to become self-supporting in regard to the feed requirements on the farm. Several valuable feeds which are comparatively rich in proteins, such as sunflower heads and various bean varieties, should receive far greater attention in the rotational system of stock farming than is at present given to them.

Cattle are not, for instance, generally regarded as consumers of animal proteins. Fibrous feeds may be utilized to great advantage by these animals. Although the ration of home-grown feeds may therefore fall somewhat short of the requirements laid down in the regulations, for the ordinary milk cow it is suggested that good results may nevertheless be obtained as long as sufficient feed is given. If the additional protein required is to be made up by giving animals a larger amount of feed, the cost and availability of the additional grain consumed will naturally have to be considered carefully.

The question of growing feeds, balancing rations, and the supplementation of home-grown feeds or buying balanced rations, is a matter which must be left to the individual farmer's careful discretion. Most farms are able to contribute at least some feed towards the upkeep of their animals. On every farm, conditions in regard to soil, climate and water are best known to the owner, who is also in the best position to tabulate his own profit and loss. The marketing system and transport facilities naturally make considerable differences to the type of farming and the balance sheet of the particular farm. It would therefore be futile to venture into cost figures in the hope that these should be used as a guide.

A Simple Feed-mixing Method.

The guide should be the principles of balancing feed mixtures and the availability of feedstuffs. The principles of balancing feed mixtures are fairly generally known by now, but the arithmetic of mixing may give difficulty. It has been considered advisable, therefore, to show by means of examples how the old cream* square may be used to advantage in feed mixing. The illustrations deal with the mixing of feeds in order to arrive at a mixture containing a required protein content, and for this purpose it is necessary to know only the protein percentages of the individual feedstuffs.

The method may be used equally well in determining how to mix other nutrients and for other mixing problems of similar type.

(1) Mixing Two Feedstuffs.

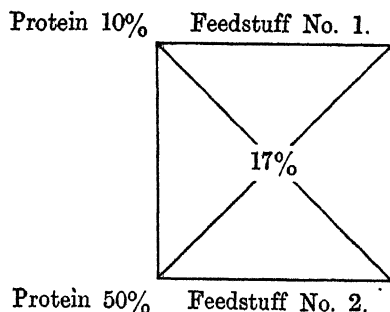
When the protein contents of two feedstuffs are known, it is an easy matter to determine in what proportions they should be mixed in order to yield a mixture containing a desired percentage of protein. But it cannot be done without thought and it is easy to slip in the calculations. For this reason the following method is recommended as being extremely simple, easy to understand and almost automatic in operation.

Given feedstuff No. 1 containing 10 per cent. protein (e.g. mealies, oats, barley, etc.), and feedstuff No. 2 containing 50 per

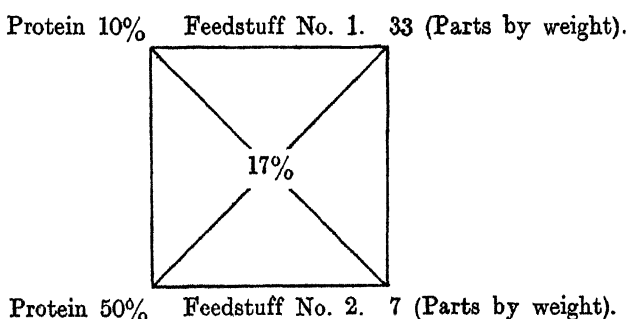
*So-called because applied in the mixing of cream.

cent. protein (e.g. peanut cake meal, carcase meal), in what proportion should they be mixed in order to obtain a mixture containing 17 per cent. protein (as for milk production)?

Write the information as on the little square below.



Then working along the diagonals, obtain the positive differences between 10 and 17 and between 50 and 17, i.e. 7 and 33, and write them in the opposite corners of the square as below.



We then conclude directly that 33 parts of feedstuff No. 1 mixed with 7 parts of feedstuff No. 2 will give a mixture containing 17 per cent. of protein.

This result is easily checked:

33 lb. of feedstuff No. 1 with 10 per cent. protein contains 3.3 lb. protein.

7 lb. of feedstuff No. 2 with 50 per cent. protein contains 3.5 lb. protein.

Therefore the 40 lb. of mixture contains 6.8 lb. protein, which is equivalent to a content of 17 per cent.

The method is quite foolproof, *provided it is not asked to do the impossible*, which is to give the proportions for a mixture whose desired protein content is—

- (a) greater than that of both feedstuffs;
- (b) less than that of both feedstuffs;
- (c) equal to that of one of the two feedstuffs.

In other words, a mixture of desired protein content, say 17 per cent., *can only be made up from two feedstuffs whose protein contents are one less and one greater than 17 per cent.* Provided this

principle is borne in mind, the little square will always do the trick, and, as has already been demonstrated, the rules for its construction are—

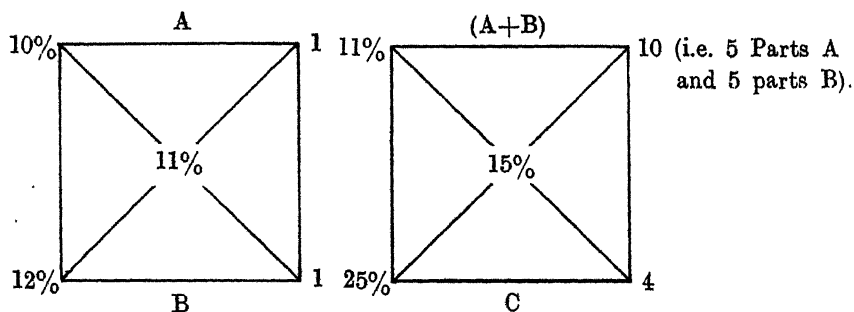
- (i) Feedstuff No. 1 is written along the top and feedstuff No. 2 along the bottom.
- (ii) The protein percentages of feedstuffs 1 and 2 are written at the two left-hand corners.
- (iii) The required protein percentage of the mixture is written in the centre.
- (iv) By calculation along diagonals, the required proportions of feedstuffs 1 and 2 are obtained at the two right-hand corners.

(2) Mixing Three Feedstuffs.

This is a slightly more difficult problem, but it may be solved on the same principle as above. For example: given A with 10 per cent. protein (grains), B with 12 per cent. protein (sunflower heads or legume hay meal) and C with 25 per cent. protein (velvet beans or cowpeas), make up a mixture containing 15 per cent. protein.

This may be done in any number of ways by first mixing two of the feedstuff and then mixing this mixture with the third feedstuff. The first mixing is paper-work only and the protein content of the mixture can be made whatever one pleases, provided one remembers that the final mixture will not have the correct protein content unless rules (a), (b) and (c) above have been borne in mind. For example, it is no good mixing the first two feedstuffs in such a way as to give a mixture of protein content equal to that required in the final mixture, for that violates rule (c).

Below are given two solutions and the reader will be able to work out any number more for himself. The procedure is simply to use two squares, fill them in according to rule and write down the final solution from the second square.



The solution is: 5 parts A, 5 parts B, and 4 parts C.

Check.

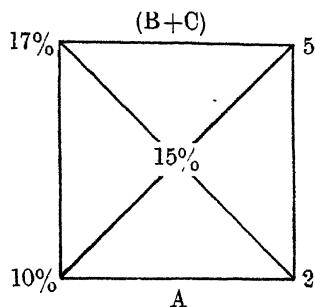
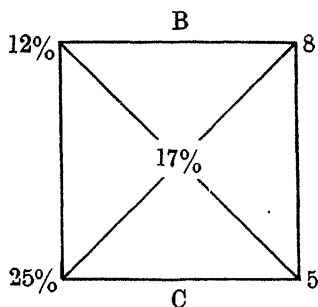
5 lb. A contain 0.5 lb. protein.

5 lb. B contain 0.6 lb. protein.

4 lb. C contain 1.0 lb. protein.

—
TOTAL 14 lb. mixture contain 2.1 lb. protein,
i.e. 15 per cent. protein.

Note that when the first two feeds have been mixed in a 50/50 proportion it is easy to read off the final solution from the second square. When the proportion is not 50/50 a little additional calculation is required. Observe the second solution.



The solution is:

5 parts (B plus C) and 2 parts A.
 i.e. $5 \times (8 \text{ B plus } 5 \text{ C})$ and $2 \times (8 \text{ plus } 5)$ parts A.
 i.e. 40 parts B, 25 parts C, 26 parts A.

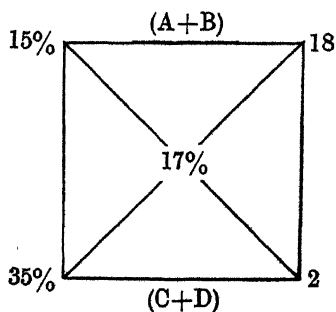
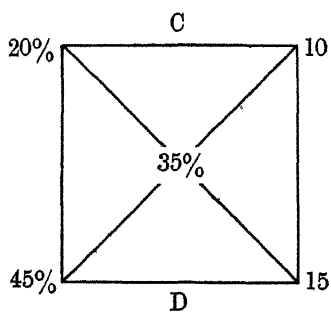
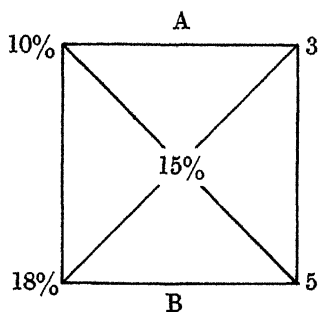
Check.

26 lb. A contain 2.6 lb. protein.
 40 lb. B contain 4.8 lb. protein.
 25 lb. C contain 6.25 lb. protein.

—
 TOTAL 91 lb. mixture contain 13.65 lb. protein,
 i.e. 15 per cent. protein.

(3) Mixing Four Feedstuffs.

Let us try yet another example, this time with four feedstuffs, A with 10 per cent. (mealies), B with 18 per cent. (copra, lucerne leaf meal), C with 20 per cent. (beans) and D with 45 per cent. (peanut cake meal). In order to mix these into a 17 per cent. mixture, use one square for any two of the feedstuffs, a second square for the remaining two feedstuffs and a third to mix the two mixtures thus obtained.



* Note that as $(B+C)=13$, A must also be 13. The first is then taken five times and second two times.

The solution is read off as follows:—

- (a) Mix A and B in the proportions 3 to 5.
- (b) Mix C and D in the proportions 10 to 15, i.e. 2 to 3.
- (c) Mix the (A plus B) mixture with the (C plus D) mixture in the proportions 18 to 2, i.e. 9 to 1.

To avoid errors in a complicated calculation and to ensure thorough mixing it may be advisable to perform these three mixing operations separately in practice. On the other hand, it means that the farmer must find a storage place for his (A plus B) mixture and a separate storage place for his (C plus D) mixture, for it is most unlikely that he will mix fortuitously just sufficient quantities of each to fit entirely into the preparation of the final (A plus B plus C plus D) mixture. For this reason, therefore, it may be as well for him to understand how to calculate the separate proportions of A, B, C, and D in the final mixture so that the whole mixing operation may be carried out in one step instead of three.

Those with a knowledge of mathematics will be able to write down the proportions at once, as follows:—

- 9 parts mixture (A plus B) and 1 part mixture (C plus D):
i.e. 9(3A plus 5B) (2 plus 3) and 1 (2C plus 3D) (3 plus 5),
i.e. 135 parts A, 225 parts B, 16 parts C and 24 parts D.

For those who prefer a more step-by-step explanation, the method of calculation is as follows:—

$$(A+B)=(3+5)=8 \text{ and } (C+D)=(2+3)=5.$$

Now, as equal amounts of (A+B) and (C+D) must be obtained before being mixed in the rates 9 to 1, multiply the first by 5 and the second by 8, thus getting 40 of each,
i.e. (15A+25B) and (16C+24D).

Then finally 9 (15A+25B) and 1 (16C+24D) gives 135 parts A, 225 parts B, 16 parts C and 24 parts D.

Check.

- 135 lb. A contain 13.5 lb. protein.
- 225 lb. B contain 40.5 lb. protein.
- 16 lb. C contain 3.2 lb. protein.
- 24 lb. D contain 10.8 lb. protein.

TOTAL 400 lb. mixture contain 68.0 lb. protein,
i.e. 17 per cent. protein.

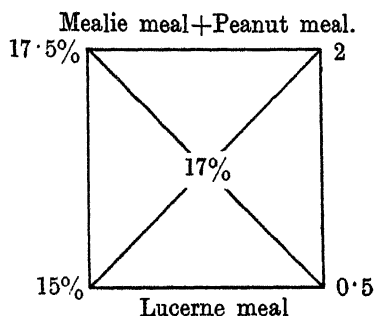
Thus, whether we have 3, 4 or more feedstuffs to mix, the method holds, provided it is remembered that *the protein percentage of the mixture always lies between that of the two things mixed.*

All preliminary mixings must be governed by this fact. For instance, it is no good mixing A and B into a 25 per cent. mixture and C and D into an 18 per cent. mixture and then trying to mix these two mixtures into a final 17 per cent. mixture. If A and B are mixed to give a content greater than 17 per cent., then the C and D mixture must have a content less than 17 per cent., or *vice versa*.

Up to now no word has been said concerning other factors which enter into the mixing of feedstuffs. Some feeds may be available in limited quantities only, some proportions may yield a quite unpalatable mixture and so on. Where these practical considerations have to be borne in mind, the mechanics of the mixing becomes more intricate and considerable ingenuity may have to be employed in the use of the little square. That is can cope with such considerations, however, may be demonstrated in the following example.

Mealie meal with 10 per cent. protein and peanut meal with 50 per cent. protein when mixed, make too gluey and heavy a ration. Lucerne meal (15 per cent. protein) is therefore introduced in order to make the mixture more friable and light, but for proper friability and to avoid too high a fibre content in the mixture, the proportion of mealie meal plus peanut meal to lucerne meal should not be higher than 4 to 1. How should the correct mixture be made up to contain 17 per cent. protein and conform to the above ratio?

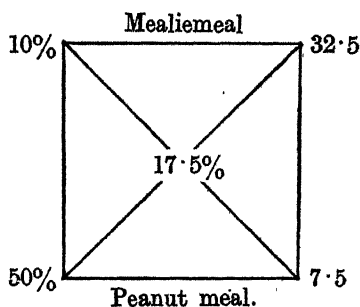
We can solve the problem by the use of two squares, but instead of first mixing the mealie meal and peanut meal and then working from there on to the next square we commence with the square which mixes mealie meal plus peanut cake meal and lucerne meal in the desired proportions as follows:—



There are several features to note in this square.

- (i) The 15 per cent. of the lucerne meal and the 17 per cent. of the final mixture are known and written in and by difference "2" goes at the top right hand corner.
- (ii) Since the proportion of mealie meal plus peanut meal to lucerne meal has to be 4 to 1 or 2 to 0.5, we may write 0.5 at the bottom right-hand corner.
- (iii) It follows then that 17.5 per cent. is the correct figure for the top left-hand corner. (Note, not 16.5 per cent., for that would mean that we would be trying to obtain a 17 per cent. mixture from two sources containing 15 per cent. and 16.5 per cent., which is impossible.)

The next square now tells us how to obtain a mixture of mealie meal and peanut meal with 17.5 per cent. protein.



The final solution may be written as 32.5 parts mealie meal, 7.5 parts peanut meal and 10 (i.e. one-quarter of 32.5 plus 7.5) parts of lucerne meal.

Check.

32.5 lb. mealie meal contain 3.25 lb. protein.

7.5 lb. peanut meal contain 3.75 lb. protein.

10 lb. lucerne meal contain 1.50 lb. protein.

TOTAL 50 lb. mixture contain 8.50 lb. protein,
i.e. 17 per cent. protein.

The discussion has ranged over the mixing of feeds with *protein* contents, but the method is equally applicable to all mixing problems where the protein or any other constituent is expressed as a percentage.

Conclusion.

In order to feed economically, it would be necessary to know what amount of any particular mixture to feed to an animal daily. This is a problem on its own and will vary for each class of animal and each type of production. The following rough example for the dairy cow illustrates a particular method of approach and may at the same time prove useful. Most average-sized cows need from 0.5 to 0.7 lb. of digestible protein daily for maintenance or upkeep of their body requirements. In addition, they require 0.5 lb. digestible protein for every gallon of milk produced. Suppose a three-gallon cow is to be fed on a home-grown mixture containing 15 per cent. total protein. Some allowance should be made for digestibility; consequently the cow should receive at least 2.7 lb. of protein daily.

10 lb. of 15 per cent. protein mixture = 1.5 lb. of protein.

10 lb. of 15 per cent. lucerne hay ... = 1.5 lb. of protein.

3.0 lb. of protein.

In addition, cows should receive greenfeed or grazing and as much clean water as they will consume.

It is not difficult to reduce most feeding concepts to simple rules, but the need for intelligent supervision and improvisation, if necessary, cannot be stressed strongly enough.

Nursery Quarantines.

The following nursery quarantines were in force on 1 October, 1946—

Howden's, Westville, Durban, on Eugenias (all), for circular purple scale.

Classing of Poultry or Culling of Non-Producers.*

II. Constitution and Selection of Breeding Hens.

P. J. Serfontein, Professional Officer (Poultry), Division of Agricultural Education and Research.

THE two factors, moulting and pigmentation, described in the previous article, are associated and used to determine the length of the period for which a hen has been in or out of production. A hen may be in production without showing signs of moulting, and yet be a poor producer. It is also possible for a hen to inherit the characteristic of being a late producer, and to be a low producer in spite of this. Single-pen records show that there is a great difference in the way which hens lay, for some birds produce two or three eggs per week, while others produce five or six eggs. This means that there are hens which lay 10 eggs per month and others which lay 28 eggs per month. The former have a low and the latter a high intensity of production. A close relationship exists between intensity of production and annual production. Hens with high intensity usually have a long production period.

Production Capacity.

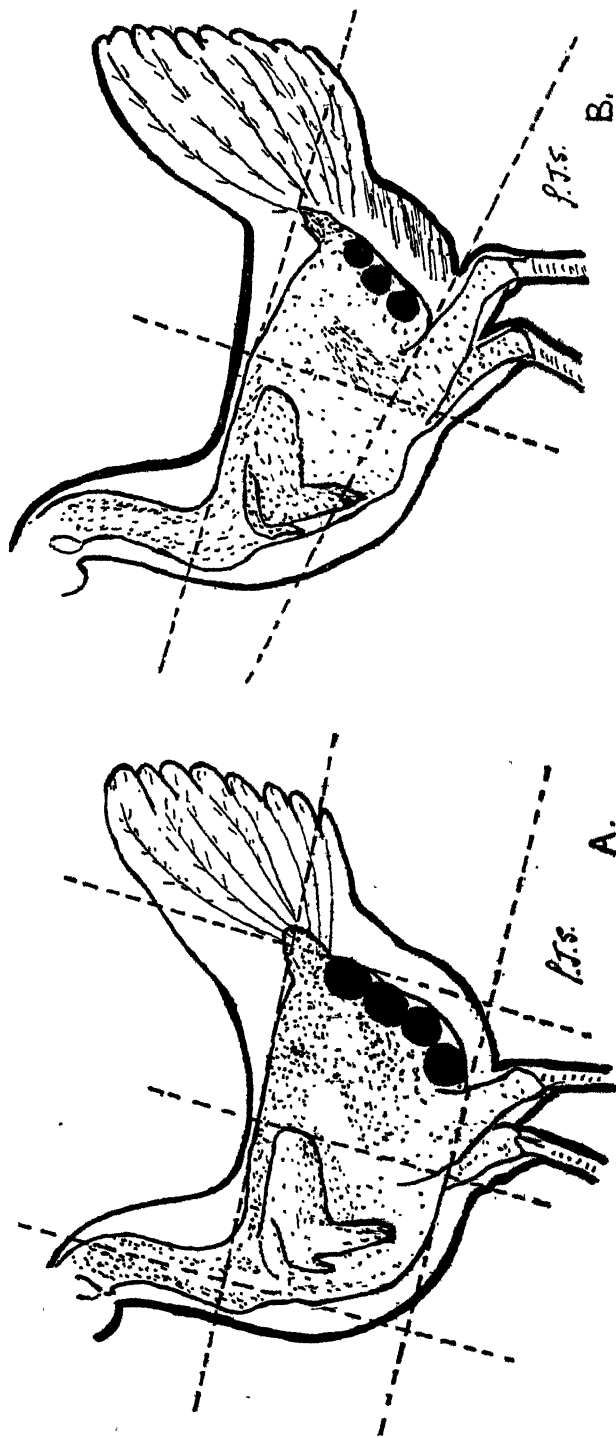
It is therefore evident that the selection of a hen with low intensity which possesses the quality of being a late producer, is a difficult matter. Various factors, such as size, type of head and body, or capacity, are said to be correlated with intensity. The writer, however, holds the view that of the many factors mentioned only two may be utilized with any degree of accuracy for the determination of intensity, and even then one should not lose sight of their shortcomings.

The first of these factors is the capacity of the abdominal cavity, which is measured from the pelvic bones to the end of the breastbone, the depth from the end of the breastbone to the centre of the back, the width and length of the back, and width and length of the breastbone. A depth of four to five finger-widths from the end of the breastbone to the pelvic bones is associated with high production, while a depth of two to three finger-widths is an indication of a poor producer. The disadvantage of this standard is that it is only applicable to hens in production, and, in addition, capacity is only a relative standard. In the case of both high and low producers the space between the end of the breastbone and the pelvic bones closes up when the hens go out of production, and the space will be the same for both types of hens. Secondly, the capacity of a hen weighing four pounds may be relatively larger than that of a hen weighing seven pounds, although the space may be smaller in the case of the former. In spite of these disadvantages, however, the capacity of the abdominal cavity may be utilized for the determination of intensity.

Ovaries, Width of Breastbone and Pelvic Bones.

Comparison of the capacity of two hens of the same size actually amounts to comparison of the space occupied by the reproductive and digestive organs. In a hen with low intensity which lays every third or fourth day, the ovaries weigh about 30 grammes. The weight of

* The first part of this article appeared in the September issue.



Poor constitution with weak build for egg-production.

Strong constitution with correct build for egg-production.

the ovaries is, of course, determined by the number of eggs developing in them. The ovaries of a hen which is out of production, weigh two grammes. In a hen which lays four, five or six eggs without missing a day, the ovaries weigh from 50 to 70 grammes. It will therefore be readily understood that the ovaries of a producer with high intensity will occupy approximately twice as much space as those of a hen with low intensity. The more eggs a hen produces, the more food she needs, with the result that the digestive organs of a hen with high intensity will also be larger. The extra pressure caused by these larger organs will increase the space between the breastbone and pelvic bones. Accordingly, the capacity of the abdominal cavity of a hen with high intensity will always measure approximately four finger-widths between the end of the breastbone and the pelvic bones.



FIG. 2.—Width of four fingers in the high producer compared with a width of only two fingers in the low producer.

Since part of the pressure exerted by the internal organs is borne by the breastbone, the latter should be straight and long. It will be a mistake, when measuring capacity, to leave the length of the breastbone out of consideration. Hens with short breastbones give the impression of having great width, but this is undesirable as the abdomen drops in such hens owing to lack of support in the posterior parts. The position and length of the breastbone can be measured by

holding the hen on the palm of the left hand, so that the middle finger touches the end of the breastbone. The back is then stroked with the points of the fingers of the right hand.

The pelvic bones of a high producer are wide apart, thin, and flexible. In the low producer they are close together and covered with a hard layer of skin. High producers tend to have fat shanks. Rounded shanks are associated with birds in which food is converted into flesh rather than eggs.

Other Quality Characteristics.

Handling quality is a second factor which may be utilized to determine a hen's intensity. Skin condition is a good indication of quality. The bodies of some hens will still be covered with layers of fat at the end of the laying season, especially in the region of the abdomen and the pelvic bones. The food in this case is inclined



FIG. 3.—A long keel is essential.

to be converted into fat instead of into eggs. In the case of the poor producer or hen with low intensity, the skin is drawn tight over the body, while in the case of a hen with high intensity it is loose, thin, and soft. This by no means implies, however, that a hen should be lean. On the contrary, it is most desirable that pullets should have a physical reserve when they come into production. This reserve is stored in the form of fat, which is broken up during the laying season, and prevents the hen from losing much weight towards the end of the season. The bodies of some good producers will still show traces of fat at the end of the season. An abdomen, which appears large as a result of thick layers of fat, should definitely be condemned.

The quality of the skin may best be determined by feeling it under the wings with thumb and index finger, or by suspending the bird by its legs and moving the thumb and index finger up and down the breast. The skin of the abdomen may be felt by resting the hen on the palm of the hand.

Quality is further indicated by a clean face with prominent eye, the absence of wrinkles in the face, and the waxy texture of the comb. It may even be indicated by the scales on the legs, those of the high producer usually being soft, smooth, and closely packed.

Temperament differs widely in different hens. High producers are usually tame, and are not easily excited when handled. Such hens are lively and active, and are always busy scratching and looking for food; they are the last to retire in the evening and the first to leave the perches in the morning, are always ready for food and always have full crops. Exactly the opposite is true of poor producers.

They remain stationary most of the time, seek the perches early in the evening, and are the last to leave them in the morning. As they are not in production, they will eat less, and their crops will accordingly be less full. Low producers are usually excitable, and are noisy when handled.



FIG. 4.—Distance between points of pelvic bone of an average producer. Those of the poor producer are usually a finger-width apart and those of the high producer usually up to three finger-widths.

Broodiness is a hereditary quality, and should not be bred into the flock. It usually occurs amongst dual-purpose breeds, although light breeds, such as Leghorns, also sometimes become broody. When a hen of a light breed becomes broody, she should not be used for breeding purposes. A hen which becomes broody is not necessarily a poor producer, and should not be culled immediately unless she continually becomes broody.. Hens mostly become broody during the warm months, and are usually out of production for 15 days



FIG. 5.—Well curved ribs of the high producer and long back with good width.



FIG. 6.—Pinched ribs of the low producer with short back showing decrease in width.



FIG. 7.—The depth of a high producer is shown.

after having become broody. As a rule such hens lose their appetite; the ovaries become considerably lighter in weight, and the vent and abdomen in consequence tend to decrease in size. The best method is to use rings of one colour for ringing hens every time they become broody. In this way all hens, which continually become broody, may be eliminated.

Selection of Breeding Hens.

This article has dealt mainly with the difference between high and low producers. These principles are naturally also applied when hens are selected for breeding purposes, but the characteristics of each breed are taken into consideration as well. A hen with any disqualifications, such as side-sprigs, etc., will not be used in the breeding pens, but may be kept for egg production. One of the most important qualities to be considered when hens are selected for breeding purposes or for egg production, is constitution.

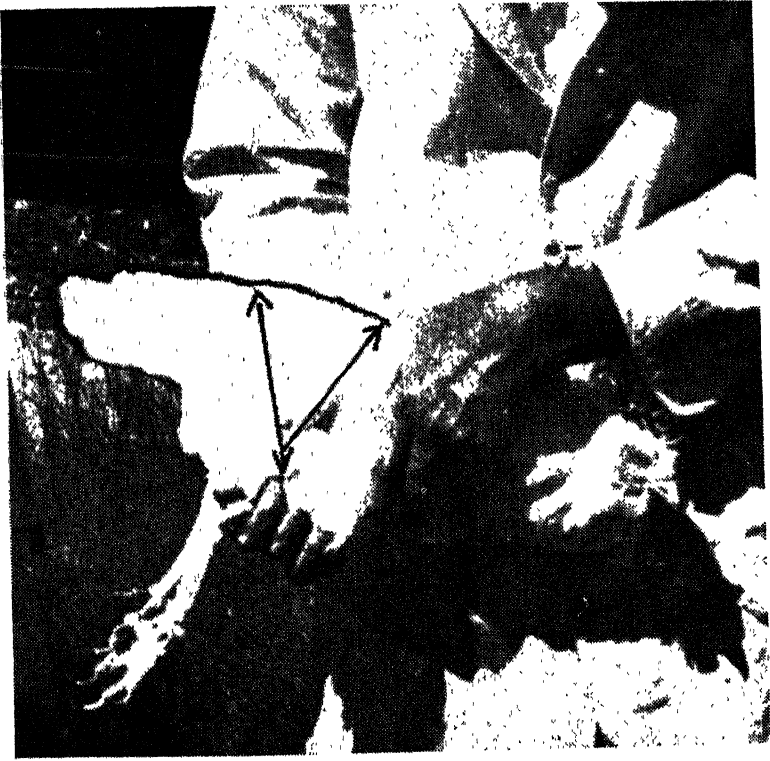


FIG. 8.—A low producer lacking depth.

Constitution, unlike colour, comb formation, etc., is not a single character but the sum total of an animal's reactions to its environment, and it manifests itself most forcibly when the animal is exposed to unfavourable conditions. The following are the qualities by which constitution in fowls may be judged: good width in head; short, strong, curved beak; prominent and lively eyes; high egg production; high hatchability; low mortality of chicks; the bird's activity; crowing in males and singing in hens; earliness in leaving

perches and lateness in seeking them in the evening; healthy appetite; fulness of crop; good weight; clean plumage; and capacity.

Poultry farming will not be practised at a loss if the flock averages 160 eggs per annum, and if the general management is such that a large number of these eggs are produced during the months when eggs are scarce. This number of eggs can be obtained only when correct breeding is accompanied by strict culling and good general management. The continual removal of weak birds from the flock is an excellent method of disease control, since weak birds are usually the first to be attacked by disease and subsequently become a source of infection.

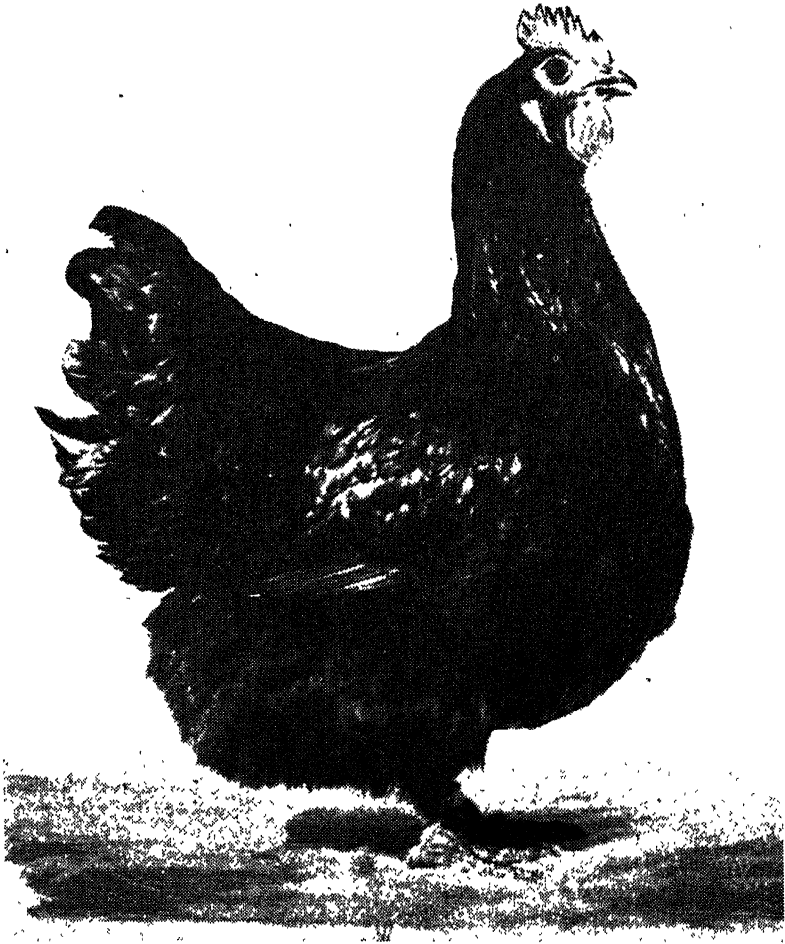


FIG. 9.—A healthy bird, the chief requirement for high production.
Note the lively expression of the face.

The number of fowls culled annually will depend on breeding, feeding, housing, and general health. Each flock will have to be culled differently. Hens produce the greatest number of eggs during the first season, and production generally decreases by 15 to 20 per cent. annually. Most of the eggs of hens of the second and third seasons are laid during autumn when eggs are low in price. After the third season only the best hens will be retained, and then only

Requirements for a Good System of Rotational Cropping.

J. J. du Toit, Lecturer in Agronomy, College of Agriculture, Potchefstroom.

MANY people have only a vague idea of the requirements for a good system of rotational cropping, and often, too, systems are practised which have practically no advantages. Actually there is no system of rotational cropping which is 100 per cent. effective and adequate for maintaining soil fertility unless fertilizers are applied to some of the crops. This fact was clearly demonstrated amongst others, by the results of the world-renowned crop-rotation experiment in Norfolk, England, which was begun in 1848 at Rothamstead, and has therefore nearly completed its first century. The practice of crop rotation has various advantages, and is the first step towards sound crop production. Crop rotation must, however, fulfill certain fundamental requirements which may briefly be summed up as follows:—

- (1) One or more legumes must be included in the system.
- (2) A comparatively large quantity of fertilizer must be applied to the main crops in the system.
- (3) Organic matter must be systematically incorporated into the soil, e.g. in the form of kraal manure or compost, green manuring or by the inclusion of a semi-permanent grazing or hay crop such as lucerne or Rhodes grass.
- (4) The crop rotation must include at least one or more inter-tilled crops, i.e. crops which are planted in rows so that weeds may be controlled. If possible, a fast growing hay crop, such as sudan grass or teff, should also be sown. Such a crop will smother certain types of weeds.
- (5) The marketing prospects, feed requirements, nature of the soil and the prevailing rainfall and climatic conditions are the deciding factors in the choice of crops for inclusion in a system of rotational cropping. Some farmers prefer to concentrate mainly on the production of cash crops, while others produce mainly fodder crops for their stock. The climate and the soil in any particular area necessarily play an important rôle in the choice of suitable crops.

It is clear, therefore, that no particular system of rotational cropping can be prescribed for all areas and under all types of conditions. Nor is it always possible to prescribe a system which fully complies with all the above-mentioned requirements. Nevertheless, the above rules should give satisfaction in most areas.

Inclusion of Legumes.

The value of legumes in the maintenance of soil fertility, is well-known. Apart from the fact that the soil is enriched with nitrogenous substances which are formed on the roots of the plants by nodule-forming bacteria, it appears that legumes are also more capable of taking up phosphate from the soil and storing it in their roots for subsequent crops.

In an experiment conducted at the Potchefstroom College of Agriculture, it was found that where maize was cultivated in rotation with cowpeas over a period of 10 years, an increase of 20 per cent. was obtained in the yield of maize which followed immediately upon cowpeas. In the next maize yield the increase was 12 per cent. No phosphate was added and the cowpeas were cut down for hay.

This increased yield may be ascribed exclusively to the effect of the roots of the cowpeas. The soil on which the experiment was carried out, happened to have no shortage of nitrogen, and the increased yield may be ascribed mainly to the accumulation of phosphates in the roots of the plants. Soils which suffer from a shortage of nitrogen as well as phosphates, will show an even greater increase in yield.

Separate cultivation.—If a leguminous crop is cultivated in rotation with maize or any other grain, the two crops should be cultivated on separate lands and not together or in alternative rows. Experiments at Potchefstroom showed that when maize and cowpeas were planted and cultivated simultaneously in alternative rows, the maize yield per morgen was considerably lower than when maize was cultivated separately.

It is more profitable, for example, to grow maize and cowpeas separately on one acre, and to cultivate each one thoroughly, than to grow alternative rows of maize and cowpeas on one morgen. It must also be remembered that the good effect of the leguminous crop will only be evident a year later on the subsequent crop.

The system of planting maize in rows 7 or 9 feet apart to render possible the rapid destruction of weeds between the rows with a tractor and disc-plough, has various advantages, but then cowpeas should not be planted or sown between the rows during December to January, since the latter will compete with the young maize plants, which have as a rule, just begun to flower, and rob the maize of its moisture. Experiments in this connection indicate that the maize yield is reduced from 5 to 8 bags per morgen by cowpeas, whereas the yield from the latter does not offset the loss in the maize yield.

Green Manuring.

The question as to whether it will be more profitable to plough in the leguminous crop for green manuring in the particular system of crop rotation rather than cut it for hay, presents a rather difficult problem. In an experiment at Potchefstroom it appeared that if maize followed cowpeas which had been ploughed in for green manuring, the yield was only 5 per cent. higher than in the case of maize which followed cowpeas cut off for hay. Under dryland conditions it is apparently more profitable to cut the leguminous crop for hay, or to reap it for seed than to plough it in for green manuring.

In the case of soils suffering from a deficiency of nitrogen, and particularly in the case of irrigated soils, it seems that the application of green manuring is advantageous. In experiments where sunn hemp was cultivated under irrigation with wheat, and then ploughed in for green manuring, the subsequent wheat crop indicated an increased yield of 50 per cent. above the control experiment.

Examples of Rotational Cropping System.

The following simple three-year rotation is suggested for maize farmers who go in for the production of cash crops. The available land is divided into three equal portions. Maize is planted on portions 1 and 2 and fertilized at the rate of 300 to 400 lb. super-phosphate per morgen. One or more leguminous crops such as ordinary beans, soybeans, cowpeas or groundnuts are planted on portion 3. The choice will largely depend on the climatic and soil conditions in the particular area, and on the marketing prospects.

No fertilizer is added to the leguminous crop. The following year the leguminous crop is cultivated on No. 1, and maize on Nos. 2 and 3. The following year the leguminous crop is cultivated on No. 2, and maize on Nos. 1 and 3. In this manner artificial fertilizer is applied to only two-thirds of the land each year.

System of Crop Rotation for the Stock Farmer.

A dairy or stock farmer must, as a rule, make provision for four types of feed, viz. concentrates, such as maize; a protein-rich hay feed, such as cowpeas or soybeans; roughage, such as teff or sudan grass, and some succulent feed such as silage, green winter grazing, pumpkins, mangels, spineless cactus, etc. The following system is suggested:—

The available land is divided into four equal portions. During the first season maize is cultivated on Nos. 1 and 2 and fertilized at the rate of 400 lb. superphosphate per morgen. Portion No. 3 is sown to cowpeas and perhaps ordinary beans or soybeans as well, without any application of fertilizer. As a guide it may be assumed that approximately 1 morgen of cowpeas will be needed annually for every cow in milk. Portion No. 4 is partly sown to maize for silage and partly to teff or sudan grass for hay, and if desired, partly to potatoes. Portion No. 4 must therefore receive all the available kraal manure and compost on the farm.

During the second year, maize is cultivated on Nos. 2 and 3, hay and silage crops on No. 1 and the leguminous crops on No. 4. The following year all the crops are shifted to the next portion, viz. maize on Nos. 3 and 4, the hay crop on No. 1 and the leguminous crops on No. 2, etc. Each portion therefore receives artificial fertilizer twice, kraal manure once and the beneficial effect of the leguminous crops once every 5 years. In this manner soil fertility is maintained at a fairly high level, while the necessary fodder crops are made available.

A System of Crop Rotation for Irrigation Farmers.

Approximately one-third to one-half of the available irrigation-water soils are set aside for lucerne, while on the remainder annual crops, e.g. wheat, barley or oats are cultivated in particular rotation during winter, and a variety of summer crops such as beans, potatoes, vegetables, etc. during summer. If the soil is very poor and sufficient manure or compost is unobtainable, half of the winter grain lands may be sown to sunn hemp for green manuring, while cash crops may be grown on the other half. During the following summer sunn hemp is again sown on the other half. It is advisable to apply 200 lb. superphosphate per morgen to the sunn hemp as well as to the following winter crop.

After 5 or 6 years, when the lucerne has been overrun by grasses, the land may be ploughed over, and annual crops planted while lucerne is again established on the other lands. Such a system of crop rotation with lucerne, will contribute greatly to the maintenance of soil fertility, especially if green manuring is applied and if fertilizers are added to some of the annual crops.

In areas where tobacco farming is practised, however, the proposed system of rotational cropping with lucerne will not be suitable, and another system will have to be developed.

Diplomas for Life Performances of Registered Cows.

H. J. Steenberg, Assistant Professional Officer, Division of Dairying.

ALTHOUGH provision is made in the regulations governing the Milk Recording Scheme for cows to be officially recorded for every lactation throughout their lives, not many breeders seem to consider it worth their while to test a cow after she has completed two mature records. Perhaps this is due to the fact that, in selecting breeding stock, many buyers have been satisfied with five or fewer records, and, to judge from sale catalogues, more often with only one or two records. Is this not the reason for later disappointment in many an animal?

It would seem that insufficient attention is given to the persistent milk producer, the one that calves regularly year after year, maintaining a high standard of production right on into old age. This is a sign of vitality and of constitution that should be taken into account by breeders. The publicity given, and importance attached, to new South African production records produced from time to time for the different age groups, without any reference to the standard of production attained for the other lactations, is not above reproach.

Recognition and Publicity Deserved.

It is an undeniable fact that the cow which year after year has produced a calf and a good milk record for 8 or 10 years, has hitherto not received the recognition deserved, and that she has also not even been in the limelight like the animal which enjoys a long rest after each lactation, and which, under these favourable conditions, consequently produces a few outstanding records. But merely compare the returns on these two cows and the difference in favour of the former will immediately become apparent as, for example, in the case of the town dairyman, who in looking for his requirements, wants the largest quantity of milk year after year from the smallest number of cows and the lowest possible percentage of replacements, because he must of necessity pay high prices for high producers. Therefore, the cow which calves regularly year after year and maintains a high standard of production for a number of years will give him the highest return. Animals with such stamina should receive recognition for life or long distance performances.

Here the Breed Society and the Division of Dairying could give the warranted encouragement. A special certificate or diploma of the total life or long distance production could be issued by the Division of Dairying for cows which have been tested regularly after every calving, at the age of 10 years or more.

Also, although provision is made in the regulations for cows to be officially tested up to 365 days, very few cows are officially recorded after 300 days—not that they have not been milked for longer, as it is often noticed from the yields recorded that the particular cow was still yielding 30 or 40 lb. milk on the 300th day of the official lactation, and was therefore certainly not dry. Thus we may find that two cows in a herd which calved during the same month at approximately the same age and both of which are due to calve 14 months hence, may have had approximately

the same yield for 300 days, but that cow "A" was able to continue yielding milk for a further 30 days after she had completed the 300 days' lactation, whereas cow "B" found the drain of the developing foetus on her system so much that she barely managed to yield milk up to the 300th day of the lactation. From the certificate of production reflecting the total yield for 300 days only, it will *not* be possible to detect this and cow "A" will be classified in the same category as cow "B" and receive no credit for the extra month during which she produced milk. For the study of production records this extra production is therefore lost. As it is, we have no particulars, nor can any be obtained, in regard to the influence of the dry period on production. In all fairness to cow "A", if it is worth milking her after 300 days, it is certainly worth recording her yield up to the stage where she is turned out as dry.

In order to complete for the life-production groups it will therefore not only be necessary to test a cow officially after every calving, but also to extend each official lactation to the full period the cow is being milked and until the actual dry period sets in.

Suggested Scheme.

Breed societies who consider it in the interests of their breed and who wish to encourage life production, could adopt a scheme whereby cows are entered for this competition through them. They might consider it advisable to call for a small entry fee, which would eventually be used by them for allotting medals or prizes to the cows which attain the highest total production and produce the greatest number of calves. The names of cows entered for this total-production competition are forwarded to the Superintendent of Dairying who keeps a record of the yield for each lactation, and, upon completion of the cow's lactation, after she has calved at the stipulated age of 10 years and more, a suitable total-production certificate or diploma is issued and forwarded to the Secretary of the Breed Society for insertion of the number of calves. This diploma, even without any prizes, would be something which the owner of the animal could value highly. This will result in a cow with a number of records to her credit receiving, through the issue of the diploma, the recognition and publicity which has hitherto been lacking.

This does not mean that we have no cows with long years of persistent production to their credit. In the case of one well-known dairy breed alone, there are no fewer than 19 cows with 8 or more official records to their credit. This, however, represents only 1 per cent. to 2 per cent. of the total number of cows of this breed tested, and a similar small percentage is observed with other breeds.

Example of Persistent Production.

Due to lack of space it is not possible to furnish all these records, but, to indicate what is meant by this, let us take only one of the cows with 9 official records.

The last official lactation was commenced five days after calving, on the 30th May 1938, and was completed on the 25th March 1939, i.e., at the age of 12 years 10 months. It can therefore be stated that this cow was in production from the age of 3 years 7 months until she was 12 years 10 months, or for 9½ years.

D. CARINA, 17895/9, BORN 22/5/26.

Production Officially Recorded as from the Age of 3 years 7 months.

Date of Calving.	lb. Milk.	lb. Butterfat.	Days in Test.
4/ 1/30.....	11,602·4	440·588	285
6/11/30.....	15,788·7	588·879	300
1/10/31.....	19,016·0	698·577	300
8/10/32.....	21,199·5	721·738	300
15/10/33.....	22,010·5	784·414	300
22/11/34.....	21,331·0	719·540	300
1/12/35.....	18,940·0	656·511	300
22/ 3/37.....	21,629·5	783·935	300
25/ 5/38.....	17,311·5	620·976	300
TOTAL.....	168,829·1	6,015·158	2,685

We cannot draw definite conclusions in regard to the number of days she was actually dry, as she might have been milked for longer than 300 days in the case of some of the last 9 lactations of 300 days; therefore all that can be concluded from the above is that during the 9½ years that she was in production she yielded milk for not less than 2,685 days, during which period she produced 16,883 gallons milk with 6,015 lb. butterfat.

During the 9½ years she produced no fewer than 9 calves and, reckoning milk at 1s. per gallon, she gave a gross return of £844 or slightly more than £91 per annum. This cow, like some others, has fully proved her worth and returned a very high rate of interest to her owner. Surely a bull from such a cow is what the breeder wants in order to breed these qualities into his herd.

Frequently by the time enough daughters of a bull are available to compare their records with those of their dams, the bull is too old for further use. In such cases the next best thing is to obtain a son of a bull which has shown the ability to increase the daughters' production over that of their dams, especially where the dams have already attained a high standard of production. When the young bull has a line of sound female ancestors and where the females have proved persistency of high production, this is an added advantage.

This is the information which specially interests the dairyman who prefers to buy young cows on the point of calving, as heavy losses are usually sustained by him before animals become acclimatized. He will want to know that the young cows he wishes to buy have been sired by a bull out of a dam with high production over a long period of years. With the expansion of our cities many dairy cows find their way to dairies supplying fresh milk to urban areas, and the requirements of these dairymen must be catered for, even if it is only to the extent of supplying sires for their herds.

From a breeding point of view, the keeping of milk records during the whole life of the cow affords a practical means of determining which cows are unprofitable, and provides a reliable estimate of the constitution of a breeding animal, as well as of the persistency of a high production capacity.

The Horse on the Farm.*

III (a). THE RUDIMENTS OF EQUITATION.

Dr. P. J. v. d. H. Schreuder and F. B. Wright, Senior
Professional Officers (Horses).

THIS article is intended to assist those who know absolutely nothing of riding and are anxious to learn. It does not purport to teach the only way of learning to ride or to describe the only type of seat that is suitable for riding.

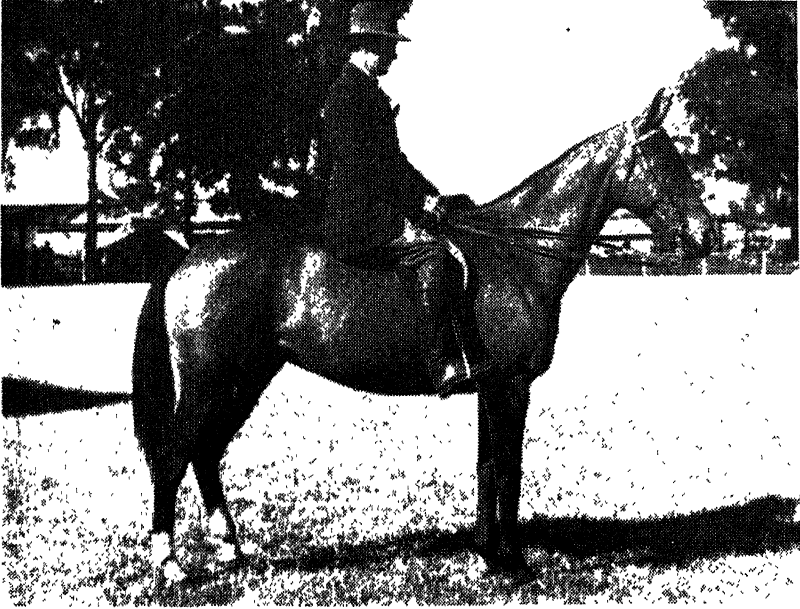


FIG. 1.—A fine type of saddle horse, bred in South Africa.

Seats and Saddles.

There is a great variety of seats and saddles, from the ultra forward, short-leathered seat of the flat-race jockey to the comparatively straight-legged seat of colonial riders, the best example of which is perhaps the Western American seat. This diversity exists because the object to be attained in each instance is different; in the case of the jockey it is extreme speed while in the case of the cow hand it is comfort during long hours in the saddle, and ease in mounting and sitting improperly broken horses. Even in the same class of riding a good deal of controversy exists. Thus we have differences in the military schools of the various European nations, and readers of sporting journals will remember the often heated controversy that raged over the respective merits of the "forward seat" and the older orthodox hunting seat. It is well, therefore, that the pupil should know of these differences, so that he will not become confused by reading differing and often conflicting statements on riding and horsemanship, which, in the writers' opinion, only go to prove that there are more efficient styles of riding than one. But

* The first and second articles of this series appeared in the September and October issues (1946) of *Farming in South Africa*.

a beginner should stick to one style until he has attained a reasonable degree of proficiency in riding. He is then in a position to test out the different schools of thought on matters of horsemanship for himself.

The style of riding detailed in the following pages is suitable, with little variation, for hacking, hunting, polo and the show ring. It presupposes the use of the trot as one of the principal paces (except in polo) and the use of the so-called English hunting type of saddle.

The first part is devoted to instructing the pupil in the simplest rudiments of riding, and the second to instruction in the more advanced elements of horsemanship.

Choice of a Horse.

The first matter to be settled in the teaching of a beginner is the choice of a horse. It is essential that it be quiet and reliable. No beginner can be expected to pay attention to his riding if his principal feeling is one of fear of an unmanageable mount. It should be a well-trained animal responsive to its rider's signals, and finally its mouth should not be spoilt. In fact, it would be far better for a novice to obtain a reliable old animal past its prime, than an active young horse that may prove too much for its rider.

Having secured a horse, the beginner must next find a suitable place for his first essay in horsemanship. It is strongly urged that the first lessons be taken within a comparatively small enclosure. The beginner then has the knowledge that his horse cannot run away with him and will thus be able to give all his attention to his lessons. Furthermore, if the enclosure is of a circular nature, the horse will soon learn to go automatically round the circle without any guidance—a decided advantage to anyone whose main preoccupation is with balance. A circular school from 30 to 50 yards in diameter is big enough.

The Bridle.

Regarding the bridle, a beginner should use a single rein snaffle-bridle as this is the most suitable. Beginners have a great deal of trouble in holding four reins correctly, and are apt to interfere unnecessarily with their horse's mouth—the consequences of which will be less if a comparatively mild bit such as a snaffle is used instead of a bit with a curb.

Saddling and Bridling the Horse.

We shall assume that the rider is going to saddle and bridle his own horse, which is being held by a servant, in the usual sort of South African head collar outside the saddle room. Before putting on the bridle, loosen the head collar and slip the nose-band off the horse's head. Fasten the head collar round the horse's neck so that you still have it under control. Now take the bridle, with the middle of the reins over the poll piece, in the right hand which is moved in front of the horse's face towards its ears. With the left hand guide the bit into the horse's mouth. If the animal is disinclined to open its mouth, place the forefinger of the left hand into the offside of its mouth. This will invariably cause it to open its mouth. Slip the ears carefully through the loop of the brow band and poll pieces and fasten the throat latch—not so tightly as to interfere with the horse's breathing or to be uncomfortable, but tightly enough for it to perform its proper function, which is to prevent the poll piece slipping forward over the poll. This does not frequently happen except as the result of some untoward accident such as a fall in jumping. The throat latch is correctly tightened if two fingers can be slipped between it and the jaw bone.

The saddle, to be properly prepared for placing on the horse's back, should have both stirrups run up the stirrup leathers to the buckle and the leathers threaded through them. The girth should be placed across the seat of the saddle. The saddle so prepared is placed from the near side on to the withers of the horse and slid back

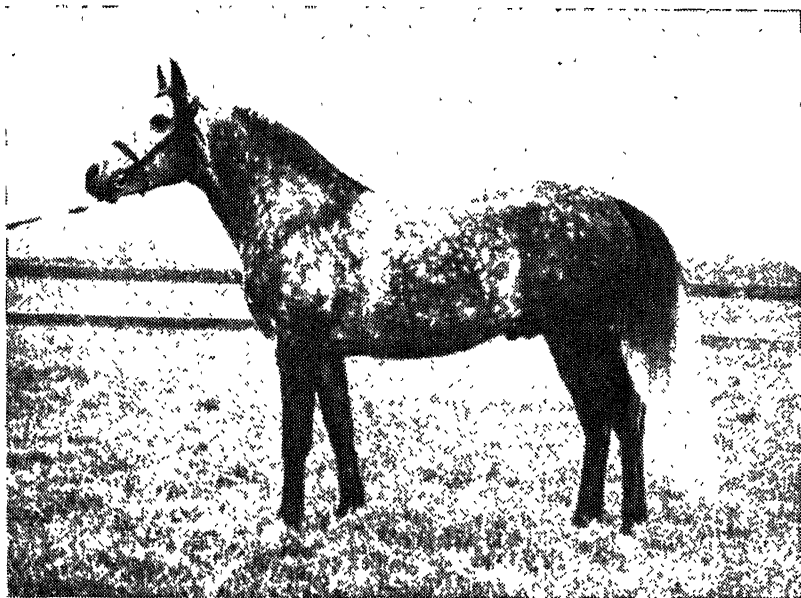


FIG. 2.—A fine type of Arab stallion showing most of the good and none of the bad points described in the accompanying text.

into the correct position. By doing this the hair of the back is smoothed back into its correct direction, whereas if the saddle were put behind the correct position and moved forward, the hair would be ruffled, and the back might become chafed.

Now go round to the off side of the horse and see that the flap or panel has not been bent under the saddle; take the girth down from the saddle, go round to the near side and fasten it up. If the saddle is fitted with a double girth, tighten the forward one first, and then the rear one. See that the rear girth completely overlaps the rear edge of the front girth, and that no skin is caught between the two girths. If it becomes necessary to tighten the girths subsequently, see that the inner one (i.e. the forward one) is tightened first. If the outer girth is tightened first it may cause a fold in the inner girth that will produce a chafe.

A horse, when girthed up, frequently blows out its chest, so that some little time later when this has been relaxed the girths will be found to be slack. It is therefore a good thing to walk the horse about a little and then take a second pull at the girths.

The horse is now ready for its rider and may be led into the riding school. The rider is ready to mount. Assuming that this is the first time the rider has mounted the horse it will be important to get the stirrup leathers approximately the correct length. This may be roughly judged by placing the stirrup iron under the armpit, and adjusting the leathers so that the finger-tips just touch the top of the buckle, where the leather is suspended from the side bar of the saddle.

Mounting.

When mounting for the first time it is as well for the beginner to have an assistant to hold the horse's head. A well-trained horse will stand to be mounted, but a great number start moving as the rider starts to mount. Even a well-trained horse may be induced by the novice's inadvertent touching of its sides to move on.

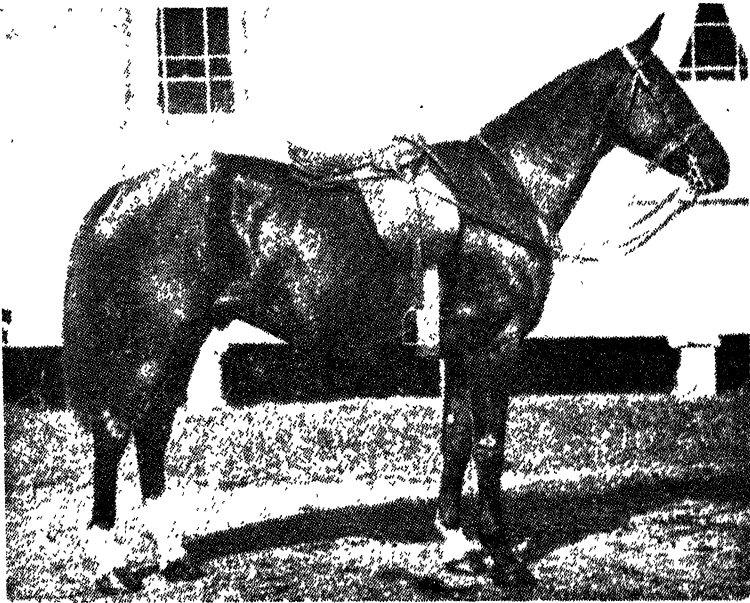


FIG. 3.—A polo pony, bred in South Africa.

Standing at the horse's shoulder and facing somewhat towards the horse's rear, the rider takes hold of the reins (more of the correct method of holding the reins anon), adjusts their length so that when his hand is resting just in front of the withers he may have a light feeling on the mouth, steadies the near stirrup with his right hand until he has inserted his left foot, transfers his right hand to the pommel of the saddle, presses his left knee against the saddle flap and springing off his right foot swings the right leg over his horse's quarters and, supporting his weight with his hands on the pommel, sinks gently into the saddle, and finds the right stirrup with his right foot.

Mistakes in Mounting.

In mounting, a beginner is likely to make the mistake of putting his foot into the stirrup from the wrong side. As the stirrup hangs naturally the foot must be inserted from the outside. When the rider is in the saddle the leather is then twisted in such a way as to be flat against the skin. If in mounting the stirrup is taken in the hand and brought round so that the foot is placed into the stirrup iron from the *inside*, the leather will be twisted in such a way that its inside edge presses against and into the shin of the rider—to his great discomfort. A simple trial will demonstrate the position. Another mistake often made by the beginner is to kick his horse in the ribs with the toe of his left foot as he swings into the saddle, or not throw his leg high enough to clear the quarters of the horse or cantle

of the saddle. Finally he may drop into his saddle with an unnecessary thud.

Dismounting.

The subject of mounting having been dealt with, it will be appropriate at this juncture to deal with dismounting. The hands are placed as for mounting, the right foot is withdrawn from the stirrup and, with the weight of the body supported on the pommel of the saddle, the right leg is swung over the quarters of the horse and brought to the ground so that the rider faces at right angles or slightly to the rear of his horse. Here again he must be careful not to kick his horse with the toe of his left foot as the left leg pivots round in dismounting. This can be avoided by pressing the left knee well into the flap of the saddle.

It is important in mounting and dismounting that the weight should largely be borne with the right hand on the pommel of the saddle as this will prevent the saddle slipping round under the belly of the horse if it has been insufficiently girthed.

Arriving at a Correct Seat.

Having gained the saddle, the rider may now adjust the stirrup leathers to the correct length. They must be so adjusted that they give comfortable support and ensure the correct seat. In arriving at a correct seat the rider will sit upright, but easily, in the saddle, facing square to the front with either the ball of the foot on the stirrup or the feet thrust fully into the stirrups (either method is correct), heels down, knee and upper part of the calf in contact with the flaps of the saddle, toes turned slightly outward, and the leg from the knee downwards slightly back, so that when the rider looks downward, the toe of his boot may just be seen projecting beyond the knee.

How to Hold the Reins;

For the first few times that the rider is on a horse it will be better for him to ride with the reins in one hand. He will then be in a position to hold on to the pommel of the saddle if his horse inadvertently breaks into a jog and he feels that his balance is in danger. The first objective is for the rider to gain confidence in himself and all his time will be taken up with adapting himself to the movement of his horse, so that the position of his hands is of small importance in the very early stages. The reins may be conveniently held in one hand by drawing them to their full length with the right hand and inserting the third, fourth and little fingers between the reins, bringing the slack through the palm of the hand and over the forefinger where they are kept in position by the pressure of the thumb. The arm should hang loosely at the side and the hand be opposite the middle of the body, and about five inches from it, just above the pommel of the saddle, with the wrist rounded and to the front. The reins should just be taut enough to maintain a light contact with the horse's mouth. By holding on to the slack of the reins with the right hand, the rider can slip the left hand up or down the reins whenever it is desired to lengthen or shorten them.

The easiest way to hold four reins in one hand is to place the little finger between the bridoon and bit reins of the near side, the third finger between the two bit reins, and the second finger between the off side bits and bridoon reins. The slack comes through the palm of the hand over the little finger and is kept in place by pressure of the thumb.

To distribute the reins in both hands, take up the reins as described in the preceding paragraph; then place the little finger between the off side bit and bridoon reins, and pull enough slack

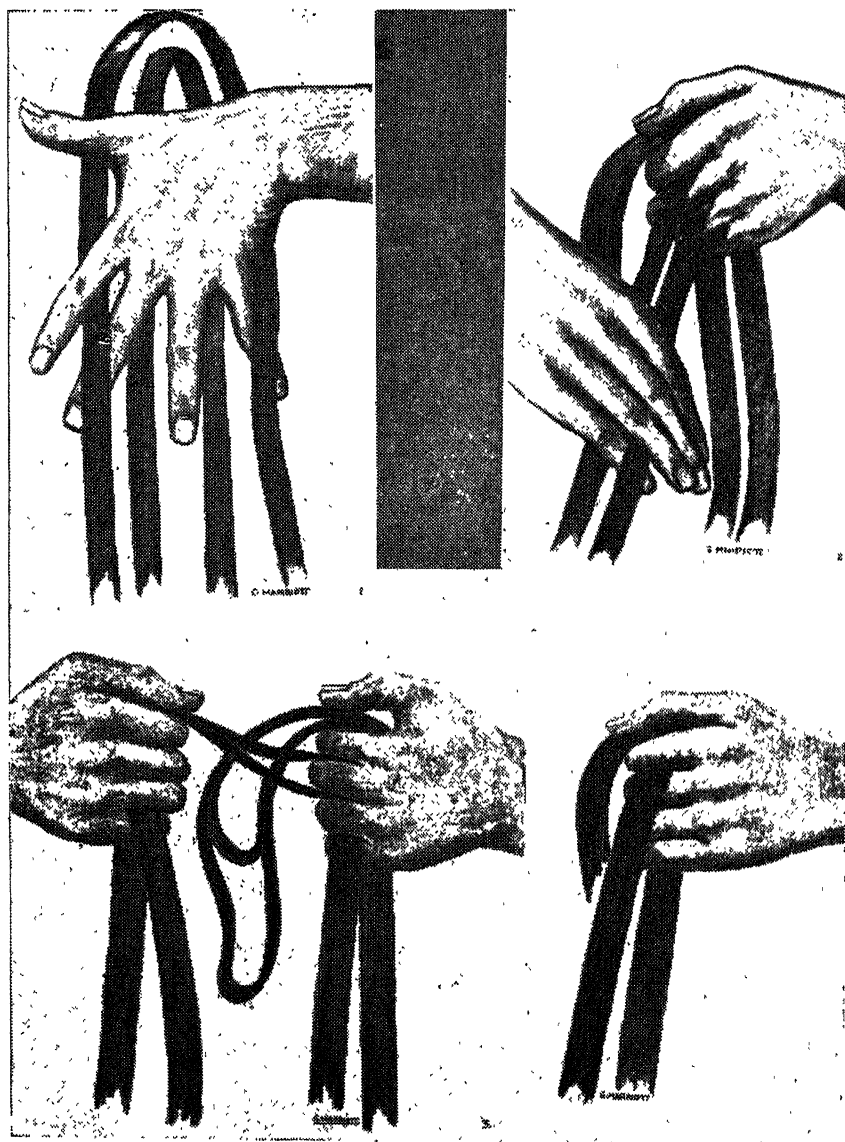


FIG. 4.—How to handle the reins.

through the left hand to bring the near and off side reins to equal length.

Setting the Horse in Motion.

The rider is now ready to set his horse in motion. This he will do by drawing back both legs and squeezing the horse slightly with his heels just behind the girths, at the same time slightly relaxing the reins. As the horse moves forward at the walk his head will move slightly up and down and from side to side with each stride. This causes an alternate lengthening and shortening of the distance between the horse's mouth and the rider's hand and in order to maintain a light feeling on the horse's mouth it becomes necessary to take

in and let out the slack of the rein, by moving the wrist backwards and forwards. There will also be a small amount of movement in the elbow and shoulder.

Halting.

The rider may walk round the school several times until he has got the feel of his horse. To halt, he should lean slightly backward, draw his legs back and give a slight pull of the reins. By doing this the rider forces the horse up to the bit so that it comes to the halt in a collected attitude. As the rider improves and gets on terms with his horse these signals will become less and less perceptible until finally the lightest touch of the rein will be sufficient to halt the horse.

Putting the Horse through Various Motions.

When the rider has settled down he may be taught to turn his mount at a walk. Assuming that he wishes to turn to the left, he will carry his left hand over to the left so that the right (off) rein presses against the right side of the horse's neck. The horse will turn away from the pressure on his neck, i.e. to the left. Turning to the right is done in the opposite manner.

As soon as the novice's balance is secure, he should ride with the reins in both hands. To do this, all he need do is to put his right hand between the reins in front of his left hand and draw some of the slack rein held in the left hand through the finger and thumb of that hand, and then slide his right hand along the right rein until the reins are of equal length. At the same time there will be a connecting length of rein between the right and left hand which will prevent the hands from becoming too widely separated.

It is important that the beginner should ride with the reins in both hands to start with. By doing so he ensures a square seat to the front. If he persists in using the reins in his left hand from the beginning there is every likelihood that he will ride with his left shoulder in advance of his right—an attitude which immediately discloses the novice. In a turn to the left with the reins in both hands the mouth is felt with the left rein and at the same time the right rein is pressed against the side of the neck. The reverse signals are used for turning to the right.

When the beginner has developed confidence at the walk, and his main pre-occupation is no longer whether he is going to fall off, he should pay attention to the correctness of his seat. He must remember primarily to keep his toes up and his heels down, to keep his knee against the saddle and let his leg hang down from the knee in a relaxed manner, but should be careful to see that it does not swing backwards and forwards. His knee grip should be only sufficient to keep his knee against the saddle flap. Riding in ordinary circumstances almost entirely a matter of balance. Any continuous conscious gripping of the saddle with the knee will soon render the rider exceedingly tired and stiff. Only in an emergency, e.g. in shying, is the knee grip tightened, while the balance is rapidly and involuntarily adjusted. The ability to keep the knee against the saddle flap will be much increased if the feet are kept against the inside branch of the stirrup. A few people with very short round thighs may find it impossible to keep the knee against the saddle. The beginner must also remember to sit square to the front and to follow his horse's mouth by adequate play of the wrists, elbows and shoulders. When he is satisfied that he is making a good show at the walk, which should be done in a matter of a few lessons, he may pass on to the trot.

As the rider is likely to find himself at sea when his horse commences to trot, he had better transfer his reins to his left hand, so

that he may have the right to grip the pommel of his saddle in preference to hanging on to the horse's mouth with the reins if his balance is upset, as it is most likely to be, until he has mastered the rhythm of posting.

To get the horse to trot, the rider will first of all shorten his reins by four or five inches. He does this because at the trot the horse carries its head higher than at the walk, and a length of rein that permits of light contact at the walk is four or five inches too long for the trot. He then simultaneously relaxes contact with the mouth and with his heels applies pressure to the horse's sides behind the girth, stronger and more prolonged than for the walk—but not excessively.

Immediately the horse begins to trot the novice will find himself bumping in the saddle. This is because at the trot the horse progresses by "springing" off alternate diagonals, i.e. the near fore and off hind leave the ground together and come to the ground together, alternately with the off fore and near hind. The rider is thrown up with each "spring" from each diagonal set of limbs. The art of posting, i.e. rhythmic rising in the saddle, consists in the ability to "miss a bump"; in other words, the rider is thrown up only by one diagonal set of limbs, and the spring from the other diagonal occurs while the rider is still "in the air". It should be noted that the rider is thrown up by his horse, and he should not consciously try to rise in the stirrups. His effort should be directed at staying out of the saddle for a period of one bump, and he will soon get the rhythm of posting if he remembers this and tries to control his too precipitant descent to the saddle by holding on to the pommel.

When the rhythm of posting has been attained, due attention should be paid to style. The beginner is apt to be thrown too high from the saddle as a result of anticipating the upward thrust of his mount. This undue exhibition of daylight between man and mount may be lessened by a conscious effort at first to delay rising until the very last moment. Afterwards this will become quite automatic.

One might also mention that a horse with an extravagant knee action, such as a hackney, will throw its rider a good deal higher than a horse with an action such as a Thoroughbred, where there is a minimum of extravagance at the trot.

As soon as the rider is confident of his posting he should ride with the reins in both hands.

He may now leave the school and ride further afield. He will, if not very nervous, and has a quiet mount, soon attain reasonable balance and firmness of seat, and should then pass on to learn the canter.

The horse may be put into a trot and then pressed into the canter by the application of pressure behind the girths with the heels. At this pace the rider should sit still in the saddle, the nature of the pace being such that the horse does not throw the experienced rider out of the saddle. Nevertheless, the beginner may not attain the correct rhythm at the first attempt and may do a certain amount of bumping about in the saddle. This tendency to bump will be much reduced if the first essay in the canter is made up a slight slope.

The novice should now begin to grasp the elements of riding. He should not, however, imagine that he is already a horseman, but if he has mastered the instruction so far, he will be in a position, by further practice and study, to become a horseman.

A Few Do's and Don'ts.

Before going on to more advanced matters it will be in place here to give a little advice on a few do's and don'ts of horsemanship.

A beginner should not trot or canter downhill. Such a procedure

by a finished horseman to balance and supple a horse is perfectly permissible, but is beyond the scope of a novice.

Always ride on soft going in preference to hard. For example, if there is a path or grassy edge alongside a tarred road, ride for preference on the former—it is better for your horse's feet and legs. If you have to choose between heavy sand and hard going, ride at a walk on the latter. Be careful of riding fast or turning suddenly on a muddy surface—your horse is liable to fall. Remember, too, that certain types of tarred road are just as slippery as mud—especially to a shod horse with worn shoes.

When you go for a ride, walk the last half mile back home so that your horse arrives home cool. If your horse is still warm when you get home, lead it about until it is cool. If a horse is not cool when put into a stable it invariably breaks out into a sweat again and runs the risk of catching a chill, besides taking more out of itself than necessary.

Whatever you do, ride quietly. It is an unfortunate fact that the more ignorant the rider the faster he considers it necessary to travel. There is nothing that brings a man more into contempt with horsemen than a senseless display of pace, and if the hard main road within the limits of a town or village is chosen by a novice to show how fast he can go, he will be regarded as being entirely beyond the pale.

Hacking is done mostly at a walk. By all means trot and canter when the opportunity occurs, but give some consideration to your horse and do not ride at such a pace that it is always in a muck sweat.

III (b). “Aids” for Advanced Horsemanship.

Up to now the beginner has been shown how to learn the rudiments of riding. Provided his nerve, hand and build are suited to horsemanship, continual practice will soon make him a tolerable rider and prepare him for a more advanced stage of horsemanship, which will enable him to get the best out of his horse. Put more bluntly, he has up to this point been more or less carried by his horse; he now prepares to learn how to ride his horse.

To do this he makes use of the “aids”. The aids are signals transmitted through the medium of hands and legs, whereby the rider makes known his wishes to his horse. The horse's forehand is largely controlled by the hands, through the medium of the reins, and the hindquarters through use of the legs. These are the natural aids. An artificial aid in the form of the whip is, if judiciously used, a valuable one.

The use of the leg aids as a means of control is due to the horse's natural instinct to fly away from anything he does not understand. We have already explained the aids used earlier in this article. To set the horse in motion from the walk we draw back the legs and squeeze the horse behind the girth. If a newly-broken horse is suddenly squeezed strongly behind the girths, he is liable to give a tremendous bound forward; in fact, if sufficiently frightened, might even pitch his rider over his head. The trainer, therefore, would be careful to touch his horse very lightly with his heels the first time—just enough to make him start forward. In a short time the horse will learn that there is no need to start forward in an exaggerated manner whenever he is touched with the heel, as no aid consequently follows, and will accept the signal as an indication of normal forward movement.

The exercises that follow will indicate to the rider how to make use of the aids to obtain various movements. For simplicity, movement to the left only is described. For movement to the right, reverse the aids.

(1) *To turn the horse on his forehand to the left, at the halt.*—Feel the horse's mouth with the bit, apply pressure with the left heel behind the girth, at the same time pressing the right rein slightly against the right side of the neck and feeling the left side of the mouth more strongly than the right. Do not apply pressure with the right leg.

At the touch of the left leg the tendency is for the horse to start into movement. Forward movement has been checked by feeling the mouth. As there is no pressure with the right leg the horse will swing his quarters away from the pressure of the left leg, pivoting on his forehand in an action which will have been helped by slight pressure against the right side of the neck with the right rein and a stronger feeling of the left side of the mouth with the left rein.

These latter aids must not be too strong otherwise the horse will move his forequarters as well as his hindquarters and turn on his middle.

The pressure of the left heel should be released momentarily after each step.

(2) *To turn to the left on the hindquarters.*—Send the horse up into his bridle with pressure of both legs. Check forward movement by even pressure of both reins on the mouth. The horse will now have brought both his hind legs under him and his weight is thus shifted back, lightening the forehand. Turn the forequarters to the left by pressure of the right rein against the neck and by feeling the left side of the mouth more strongly with the left rein. Prevent the quarters from flying round to the right by strong pressure of the right leg.

In teaching a horse this movement it is useful to have him close to a wall on his right side and to turn away from it. The wall will prevent him from swinging his quarters to the right, and act as an additional artificial "aid" to the pressure of the right leg.

(3) *To passage to the left.*—A passage is a sideways movement of the horse. The forehand very slightly leads the hindquarters and the head is slightly bent at the poll and inclines in the direction of progression—in this case to the left. The right hind foot is crossed over *in front* of the left hind and the right fore *in front* of the left fore foot.

Fore, the aids are applied as for the turn to the left on the hindquarters, except that the pressure of the right leg is increased, so much so that the hindquarters are induced to move over to the left instead of merely being steadied as in the former movement.

Before beginning the passage it would be as well to do the half passage. This can be done at the walk, while riding down a road, when the application of the above aids will cause the horse to move sideways across the road, at the same time making progress to the front. This will be easier to the horse at first than the full passage.

In both the passage and half passage momentary relaxation of pressure of the right leg should take place after each step.

(4) *To rein back.*—Every horse should be taught to rein back in a collected manner.

By slight even pressure of the legs the horse is sent into his bridle and made to collect himself. At the same time even pressure is applied to his mouth to prevent his going forward, and with increased pressure on the mouth he is induced to step back. After each step the pressure on the mouth is momentarily released. Should there be any tendency for the hindquarters to swing to either side, this should be checked by pressure of the appropriate leg.

In teaching a horse to back it is as well to commence dismounted. Take the reins in either hand and exert pressure on the mouth. As

soon as a backward step has been taken, the pressure may be released and the horse petted and rewarded.

If the horse is particularly stubborn about moving back, an assistant should tap his shins alternately with a cane. When the rider can carry out the movements just described, he will be in a position to learn how to get his horse to canter with either fore leg



FIG. 5.—Reproduction of water-colour prints of the Cape Mounted Rifles (1827–1926), reprinted with the kind permission of Libertas (Vanishing Spoons: Major Tilden) and courtesy of the Cape Archives and Africana Museum.

“Wherever the motorist of to-day goes—and in many places where he cannot go—these old guardians of the frontiers have passed and repassed during a century of history..... The horses were cheap and lasted for years”.

Note the distinct Arab type of the remounts of those days.

leading; but in order that he should know what he is doing, it is necessary to digress a little and to make a somewhat detailed examination of the movements of the horse's legs during the canter. If a horse is listened to while cantering along a hard road, it will be heard that this pace has a three-beat rhythm and the reason for this will be apparent when the movement of the legs is studied.

During the canter there is a period of suspension when the horse has all four legs off the ground. The first foot to strike the earth

after a period of suspension is a hind foot. In this case let us suppose the near hind. The next legs to follow are the near fore and off hind simultaneously. The horse now has three legs on the ground and it springs forward with the primary propulsion coming from the near hind leg, the body pivoting over the off hind and near fore legs. As the near hind leg is snatched up, the advanced off fore leg comes to the ground so that the body is again supported on three legs.

The impulsion of off hind and near fore is now given and carries the body forward, the off fore leg acting as a pivot. As the body comes forward, the near fore and off hind are simultaneously lifted so that for a period the centre weight is borne on the off fore leg alone.

Finally this also is snatched up and a period of suspension follows when all four legs are off the ground.

Of course, the movements described take place too quickly to be visible to the unaided eye, but are easily followed in a slow motion film. In the instance quoted the horse is cantering with the off fore leg leading.

If a cantering horse is watched, it will be seen that one fore leg is always in advance of the other. The advanced leg is known as the leading leg. This can be well seen by the rider looking down at the fore legs of his horse when it is cantering; in fact, he can tell by the feel of his horse on which leg it is cantering, without direct observation, for the shoulder of the leading leg is also advanced more than that of the opposite fore leg and there is a tendency for the rider's leg on the side of the horse's leading leg to be carried more forward than that of the opposite side.

The importance of the leading leg at the canter is chiefly in turning. Most text books on the subject of riding will tell you that if a horse is turned to the left when he is leading with the right fore leg, there is danger of his crossing his legs and coming down. The writers have never seen this happen and think the statement much exaggerated.

Nevertheless, a horse turns much more easily and infinitely more quickly to the side of the leading leg and in a game like polo this is a matter of paramount importance. When moving in a circle, a horse canters with more comfort to himself and his rider when he leads with the inner fore leg. Furthermore, the leading leg, as has been explained, bears all the weight of the horse at certain phases of the canter, whereas the opposite fore leg shares the weight with its diagonal hind leg.

It will be gathered therefore that it is desirable that a properly trained horse be able to canter with either fore leg leading, at the rider's will.

We can get him to do this by the use of the following aids (in this case to lead with the off fore):—

Collect the horse by feeling the reins and sending him up into his bridle with pressure of the legs. Turn the head a little to the left. When sending him forward by leg pressure see that the left leg is applied behind the girth and with greater pressure than the right leg. By doing this you commence a half passage. The left leg is advanced and primary impulsion comes from it. It follows from the sequence of the leg movements that the off fore will lead, and this desideratum is further aided by turning the horse's head to the left, thus freeing the off fore leg of a certain amount of weight and thereby increasing the tendency to lead with that leg.

Agricultural Engineering.

II. Elementary Land Measuring.

E. A. Oosthuizen, Lecturer in Engineering, College of Agriculture, Potchefstroom.

Land measuring is the process of fixing the relative positions of points on the surface of the ground for the purpose of determining areas, distances and angular measurements.

For the simple measurements which the layman is called upon to make, expensive instruments are not necessary. All that is required is a good 100-ft. tape, but care and accuracy are essential.

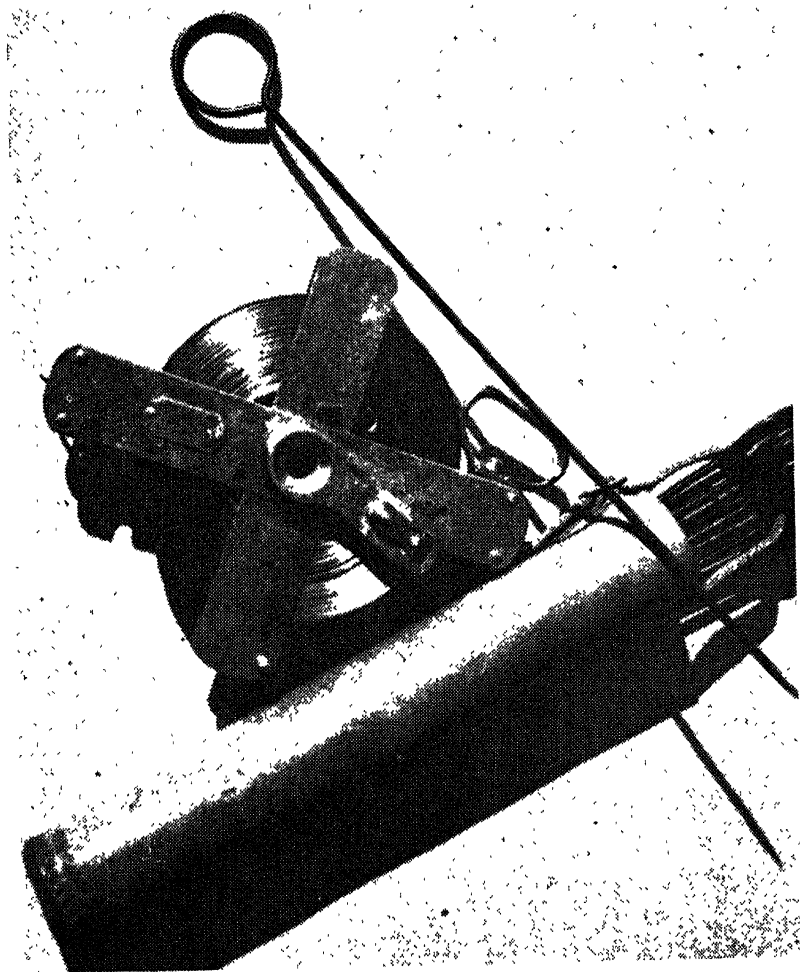


FIG. 1.—Tape measure and quiver containing steel wire pins.

- (1) To measure the distance between two points with a 100-ft. tape.

For marking the end of the tape on the ground, ten pins or markers are required. These can be made from No. 8 gauge steel wire, 15 inches long, as shown in Figure 1. First mark the two

ends of the line to be measured with thin straight flag sticks. An assistant (called the leader) takes the forward end of the tape and a pin in his left hand and the remaining pins in his right hand and proceeds in the direction of the line. The follower, who holds the back end of the tape, squats behind the flag stick facing the leader who, when the full length of the tape has been stretched, stoops forward with his left side towards the follower, and holds the pin as far out as possible in a vertical position with the point touching the ground. The follower, now having a clear view of the forward flag stick, sights along the line and directs the leader by waving his hand to left or right until he sees the pin in line with the forward flag stick, and then signals the leader to push the pin into the ground. The follower, using both hands, now holds the 100-ft. mark of the tape exactly opposite the centre of the flag stick, while the leader squats facing the follower and throws up the tape once or twice until it lies in a straight line touching the pin in front of him. The leader pulls the tape taut without using too much force and, dropping the nine arrows beside him, pulls out the pin with his right hand and pushes it into the ground perpendicularly exactly opposite the zero mark of the tape. The leader picks up the pins (these are best kept in a leather quiver with a thong through the rings) and both men advance another tape-length. On reaching the arrow, the follower squats behind it while the leader takes up his position with his left side towards the follower and holds the tape and arrow as far out as possible with his left hand as he stoops forward. After the follower has directed the leader on to the line, he holds the handle of the tape with both hands so that the 100-foot mark is opposite the centre of the pin, while the leader throws up the tape to bring it in line and inserts the pin opposite the centre of the zero mark. The follower, on rising, pulls up the pin and takes it with him and they advance in this manner until the ten pins have been used, the follower collecting the pins as the measuring proceeds. When the tenth pin has been inserted in the ground, the leader waits for the follower to come up and replace the tenth pin by a short wire marker, which he carries in his pocket for the purpose. The follower now counts the pins in his possession and hands them over to the leader, and the measuring of the line proceeds. When the end of the line is reached, the leader holds the zero mark of the tape opposite the centre of the flag stick and the follower reads the tape opposite the centre of the last pin and enters the total number of tape lengths and the additional feet and decimals of a foot or inches in his field book. The line should now be checked by measuring in the reversed direction.

(2) To measure a distance on sloping ground.

In land measuring all distances have to be measured horizontally. It is obvious that when the ground is sloping the distance measured along its surface will be too great and will have to be reduced to the horizontal. This, however, necessitates measuring the angle of slope, and, since no instruments are at our disposal, we have consequently to resort to some other more practical method. With care, a distance can be measured horizontally, in steps, up or down a slope with the tape. It is easier, however, to measure down a slope than up it, but the distance should be measured both ways and thus checked.

In measuring down a slope the zero end of the tape is held by the follower against the centre of the flag stick indicating the

upper extremity of the line, and the leader, who should be the more experienced of the two, either holds the full length of the tape in a horizontal position, or, if the slope is steep, he takes hold of the tape at any convenient even number, say 40 or 60 feet, and holds the portion of the tape horizontally. The follower directs the leader on to the line and, when in position, he carefully transmits the reading on the tape to the ground by means of a heavy plumb

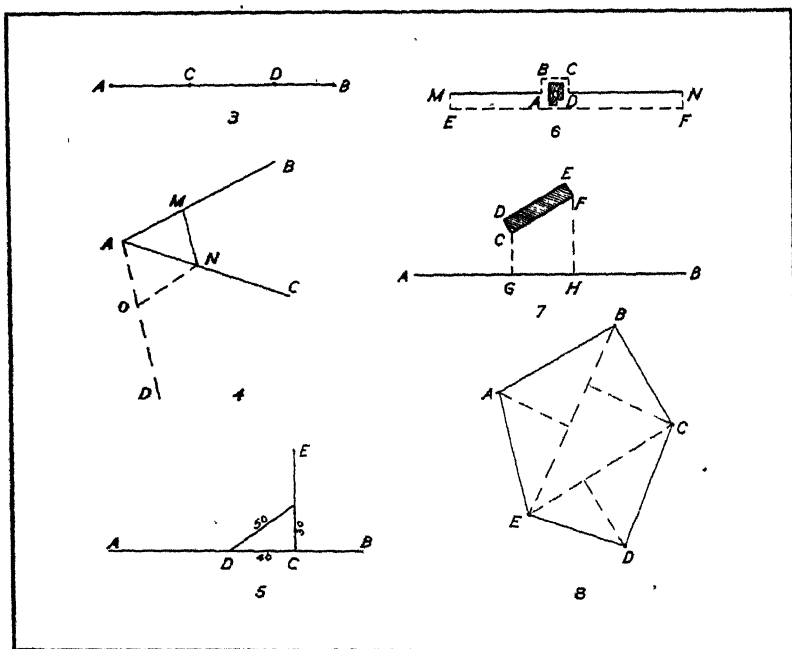


FIG. 2.—Showing how the tape and plumb bob are held.

bob on a thin line (Fig. 2). The tape should be held in the left hand with the elbow hard up against the body so as to steady the tape in the horizontal position. The plumb line is held in the right hand and the bob steadied near the ground, the line being in the centre of the division on the tape to be read. The bob is then gently lowered so that the point touches the ground. A pin is inserted where the point of the bob struck the ground. The distance read on the tape is recorded in the field book. The two men then move forward, the follower holding the zero mark opposite the centre of the pin, and the process is repeated.

In measuring up a slope, the follower pulls out the flag stick marking the lower end of the line, and suspends his plumb bob exactly over the centre of the hole, holding the tape at a convenient height so that he can easily read the numbers. The leader proceeds until the tape is in a horizontal position and then, after having been directed on to the line by the follower, inserts the pin opposite the centre of the zero mark of the tape, while the follower, holding the tape steady, watches both the point of the bob and where the plumb line cuts the tape.

The tape is moved forward until the follower reaches the pin which he pulls up almost clear of the ground and then pushes over at an angle so that it will not interfere with the point of the plumb bob. The bob is then suspended over the hole and the measurement taken as before. At the end of the line all the short horizontal distances are added together and their sum will be the horizontal projection of the distance between the two points.



Figs. 3, 4, 5, 6, 7 and 8.—Diagrams referred to in the text.

(3) To measure a line divided into several portions.

Let AB (Fig. 3) be the line divided into three portions by the points C and D. Commencing at A, measure continuously to B, noting the tape readings at C and D. For instance, if the distance AC is 420 feet, the measuring is continued from the pin marking the 400 feet. Similarly, if the distance AD is 790 feet, the measuring of the line is resumed from the pin marking the 700 feet. The distances AC, CD and DB should *not* be measured independently and added together to obtain the total distance.

(4) To set out a straight line between two stations when the view between them is intercepted by intervening rising ground.

Two men should go to some intermediate point from which both stations are visible. Then, by receding from each other and *turning face to face* so that each sees his station clearly, each holds a straight stick vertically on the ground. They then direct each other to right or left until the two sticks are both in the straight line connecting the two stations. The direction of the line may then be seen from either station.

(5) To measure an angle with the tape.

If the angle is acute, measure a convenient distance AM along the line AB and a convenient distance AN along the line AC (Fig. 4), and then measure the distance MN between the extremities of the two lines measured. Since the three sides of the triangle MAN are known, the angle BAC is determined, and can be represented on paper to a convenient scale without one's actually knowing the value of the angle in circular measure. If the angle is obtuse, it may be divided into two angles BAC and CAD, each being measured separately.

(6) To set out a right angle with the tape at a point in a straight line.

If C is the point in the straight line AB at which the right angle is to be set out, measure CD equal to 40 feet in line BA (Fig. 5). Let an assistant hold the zero end of the tape at D and another the 80-foot mark at C. Then, if the tape is now pulled taut in both directions by a third person, the 50-foot mark will indicate a point on the perpendicular CE.

(7) To construct a cross-staff and to test its accuracy.

Prepare a piece of wood exactly 4 inches square and $1\frac{1}{2}$ inches thick. Accurately mark the diagonals and with a tenon saw make a cut $\frac{3}{8}$ inch deep along each diagonal and mark one slit A and the other B. Drill a $\frac{3}{8}$ -inch hole in the centre on the underside of the block and into this fit one end of a straight broomstick, the other end of which is spiked.

To test the accuracy of the appliance, push the spiked end of the cross-staff into the ground so that the broomstick stands in a vertical position. Have a flag stick put into the ground at a distance of, say, 100 yards, and turn the cross-staff head fitted on the broomstick until the flag is sighted through slit A. Have a second flag placed 100 yards away exactly in the line of sight through slit B. Now turn the cross-staff head so that slit B sights the first flag and, if the diagonals have been cut truly at right-angles, the second flag will be sighted through slit A. If this is not the case, a new cross-staff head should be made.

A more useful cross-staff can be made by using slit sights screwed to a piece of wood (Fig. 5A.) The sights consist of metal plates with fine saw cuts for the slits.

One of the advantages of slit sights is that they can be adjusted until the lines of sight are truly at right angles. Another advantage is that on sloping ground objects can be observed with greater ease and accuracy.

With the cross-staff a perpendicular or ordinate can be set off quickly at any point in a straight line. Care should, however, be taken to see that the staff stands truly in the straight line on to which

the perpendicular is to be thrown off. If the staff is on the line, the flags at the extremities of the line will be visible through one of the slits when sighted from opposite directions.

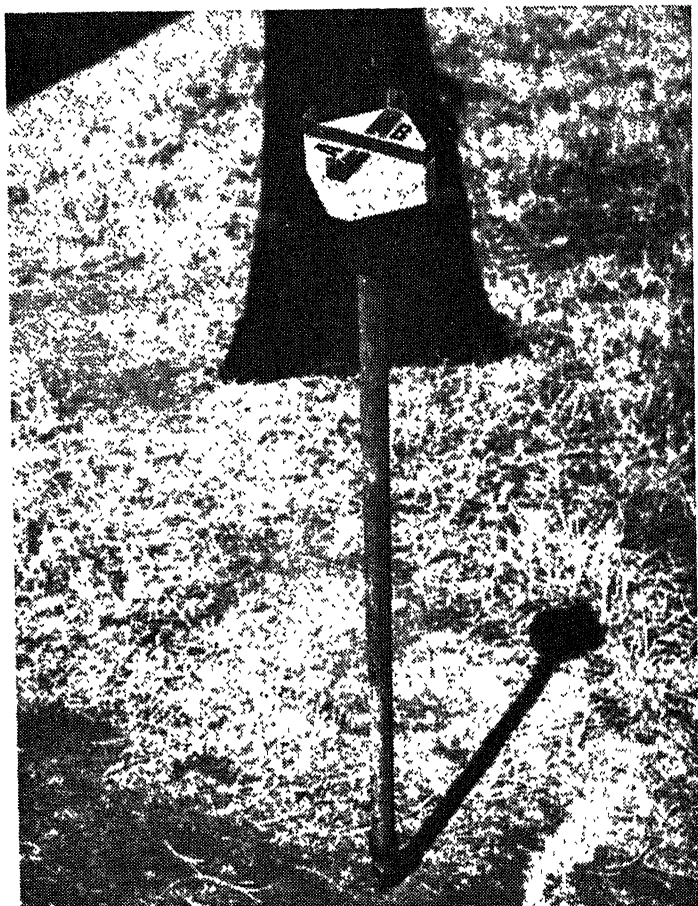


FIG. 5A.—A cross-staff.

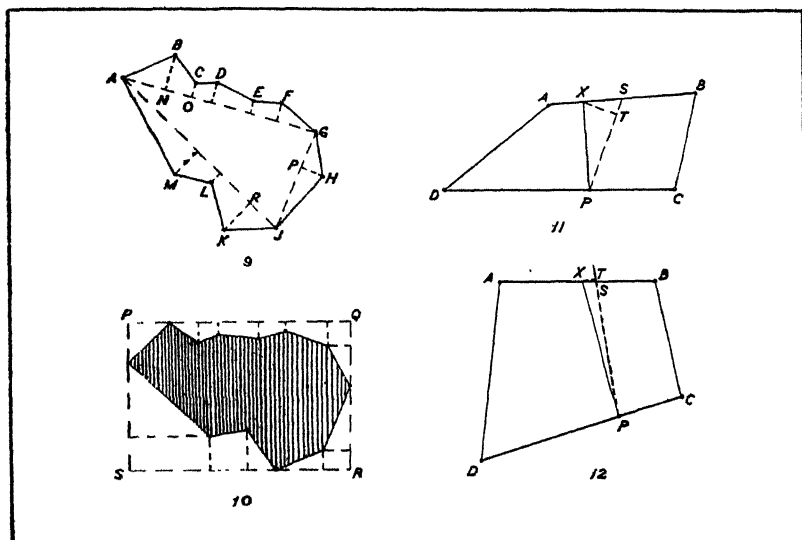
(8) To measure the distance between two points when there is an obstruction on the line.

In Figure 6, let H be a low building over which a tall flag erected at N can be clearly seen from M. Place a flag at A on the line MN. Measure the distance MA and at A set off the ordinate AB so as to clear the obstruction. At B set off the ordinate BC and at C set off the ordinate CD. Measure the distances AB, BC and CD, making CD equal to AB, so that the point D will lie on the line MN. Measure the distance DN. The distance MN will then be equal to the sum of the distances MA, BC and DN. If there is a hedge or fence on the line MN, take a line parallel to MN and a convenient distance away so as to clear the obstruction. By means of the cross-staff find the point E so that MEF is a right angle. Also find the point F so that NFE is a right angle. Measure the distance between E and F, which will be the length of the line MN.

(9) To fix the positions of objects by means of ordinates.

Let AB (Fig. 7) be a straight line and let it be required to fix the position of the building CDEF from this line. By means of the cross-staff find the point G in the line AB so that the ordinate GC passes through the corner C. Similarly find the point H so that the ordinate HF passes through the corner F.

Measure the distances AG and AH, as described under (3) and the lengths of the ordinates GC and HF, and also the length DE and the width DC of the building. Plot on paper to a convenient scale.



FIGS. 9, 10, 11 and 12.—Diagrams referred to in the text.

(10) To measure a triangular piece of ground which is open and accessible.

Measure the three sides or the longest side and the perpendicular height of the triangle from this side. In the first case the area = $\sqrt{s(s-a)(s-b)(s-c)}$ where a, b and c are the respective sides of the triangle and $s = \frac{\text{sum of sides}}{2}$

In the latter case the area = $\frac{1}{2}$ side \times perpendicular height.

(11) To measure a piece of ground with five or more sides which is open and accessible.

Measure the sides and the diagonals (Fig. 8), or the diagonals and the perpendicular heights of the triangles thus formed. The area of the piece of ground will then be equal to the sum of the areas of the triangles ABE, EBC and DEC, etc.

(12) To measure any piece of ground from within, when the ground is open and accessible.

Take convenient diagonals AG, GJ and AJ (Fig. 9). With the cross-staff set off ordinates from these diagonals to the several corners of the piece of ground, such as NB, OC, PH, RK, etc. Measure

the ordinates and the distances AN, AO, etc., along the lines AG, GJ and JA, as described under (3). The figure can now be plotted on paper and the area found by adding together the areas of the several triangles and trapezoids. Thus the area of ABN = $\frac{1}{2}$ AN × NB, and the area of NBCO = $\frac{NB + OC}{2} \times NO$.

The area of the triangle AGJ can be computed from its three known sides. The approximate lengths of the sides of the figure can be found by scaling from the figure plotted on squared paper.

(13) To measure any piece of ground from without when the ground itself is inaccessible.

With the cross-staff set out a rectangle PQRS around the piece of ground to be measured (Fig. 10), making the sides of the rectangle pass through the corners of the ground where possible. Set off ordinates from the sides of the rectangle to the several corners. Measure the ordinates and the distances along the lines PQ, QR, RS and SP. The figure can now be plotted on paper and the area found by computing the area of the outer rectangle PQRS and then subtracting from it the sum of the areas of the triangles, rectangles and trapezoids lying between the sides of the outer rectangle and the boundary of the piece of ground. In dividing a figure into triangles, or in choosing the principal lines from which measurements are to be taken, care should be exercised to obtain:—

- (a) well conditioned triangles (Fig. 8), and
- (b) the shortest ordinates possible.

(14) To cut off any quantity from a piece of ground by a line drawn from an assigned point in the boundary.

Set off from the given point P (Fig. 11) the quantity proposed, as nearly as can be guessed, by the line PS and measure the ground thus set off.

Then divide the differences in square feet between the quantity proposed and the quantity set off, by half the length of the guess line PS in feet, and the quotient will be the length of a perpendicular TX in feet to be set off either on one side or the other of the guess line, according as the quantity set off is greater or less than the quantity proposed. To this perpendicular draw a new division line PX and it will cut off the quantity required.

Example.

From the point P (Fig. 12) in the side CD of the piece of ground ABCD, cut off one third by a straight line intersecting the side AB.

Data.

AB = 2,000 feet.
BC = 1,500 feet.
CD = 2,730 feet.
DA = 2,300 feet.
BD = 3,220 feet.
CP = 860 feet.

Area of ABCD = 4,324,800 sq. ft.

Area to be cut off = $\frac{4,324,800}{3} = 1,441,600$ sq. ft.

Let PS be the guess line.

Trial area BCPS = 1,315,000 sq. ft.

Difference = 1,441,600 - 1,315,000 = 126,600 sq. ft.

Length of guess line PS = 1,740 feet.

Length of perpendicular TX = $\frac{126,600}{870}$ = 145.5 feet.

Area thus cut off by division line PX is 1,441,600 sq. ft. or $\frac{1}{3}$ of the area ABCD, and BX = 930 feet.

English and Cape linear and square measure.

1,033 English feet = 1,000 Cape feet.

12 Cape feet = 1 Cape rood.

600 Cape sq roods = 1 morgen.

1 morgen = 2.1165 acres, or $2\frac{1}{4}$, nearly.

1 acre = 43,560 English sq. feet.

1 sq. mile = 302.08 morgen.

The Horse on the Farm :—

[Continued from page 760.]

Galloping.

The gallop has essentially the same rhythm as the canter, the strides being longer and faster.

In this pace the rider supports his weight on the knees and stirrups, leans forward somewhat, and raises the seat slightly from the saddle. Leaning forward should be no more than is necessary for correct balance and should not approach the extreme of the jockey seat.

Nothing spoils a horse so much as frequent galloping and it should only occasionally be indulged in. The rider, of course, should have sufficient sense to see that he has plenty of space in which to pull up and sufficient regard for his horse's legs not to gallop on hard going.

Up to this stage it has been presumed that the rider has been using a snaffle and single rein. When he has become a proficient horseman, and specially when he comes to the more advanced elements of riding, he will find that his horse can be trained to a higher pitch of excellence in a double bridle or a pelham than in a snaffle.

Not many horses will flex at the poll and yield their lower jaws in a snaffle as efficiently as they will in a crush bit. On the ability of a horse to do this largely depends his balance, and on his balance his performance as a riding horse is mainly based. A horse is said to be properly balanced when its weight is distributed over each limb in such a way as to enable it most easily to obey the commands signalled to it by its rider by means of the aids. In practice this means bringing its hind legs more under it than when standing or moving in the natural way, so that more weight is taken on them and less on the forelegs (lightening the forehand). To do this and remain under perfect control it is necessary for the horse to raise its head and bend its neck at the poll so that the line of the face is at an angle of about 60° to the ground.

A common sight on small South African country shows is to see horses ridden in a long shanked single-rein crush bit, with their heads at right angles to the ground or bowing into their chests. In such cases the neck is well bent, but the bend is well behind the poll. The horse is anything but balanced, as in this position the weight is largely carried on the forehand, and the horse is bending its neck to evade pressure of the bit, and thus, as far as the finer aspects of horsemanship are concerned, is out of control.

Preliminary Investigations on the Black Spot Disease of Citrus.

Dr. Vincent A. Wager, Officer-in-Charge, Botanical Station, Durban.

IN the September 1945 issue of *Farming in South Africa*, the Black Spot* disease of citrus was fully described. The object of this article is to report on the presence of the disease and to discuss the problems connected with its control.

Occurrence.

In spite of the exceptionally dry spring months during the past two years, Black Spot has continued to flourish and cause serious damage in many localities. It had been thought that the disease was confined to mist-belt areas, but now it seems likely that even in dry areas, or dry seasons, rains, no matter how slight, may be frequent enough to allow infection of the young fruit to take place.

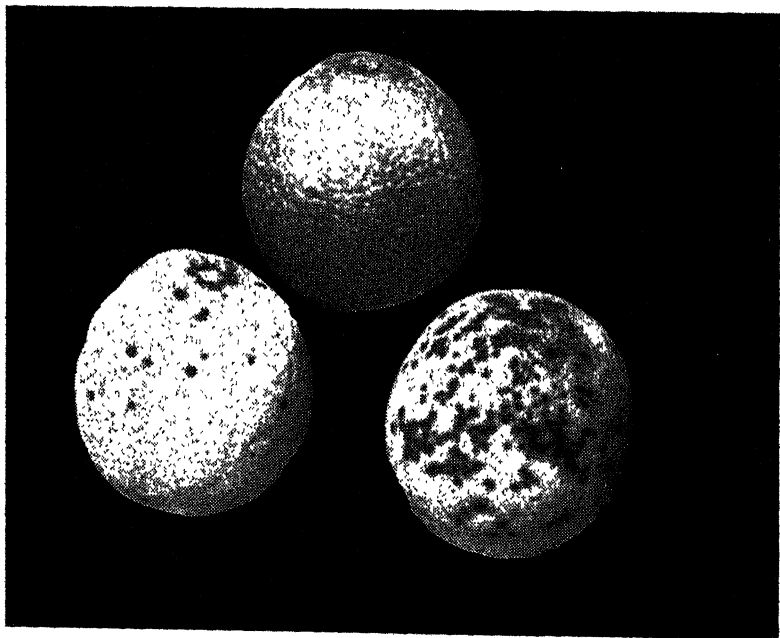


FIG. 1.—In an orchard at Richmond three sprayings of full-strength Bordeaux mixture completely controlled the disease as shown by the top orange (which is much greener in colour). On the unsprayed trees alongside, the amount of disease varied between the two extremes shown on the two lower fruits.

The disease has now been found on oranges, lemons, grapefruit and naartjies in the following places in South Africa:

Natal.—Crammond, Otto's Bluff, Pietermaritzburg, Nelsrust, Richmond and Bulwer (mist belt), Umkomaas Valley (dry thornveld), Verulam, Tongaat and Compensation (coastal region).

Zululand.—Nkwalini Valley (dry thornveld).

* Caused by the fungus *Phoma citricarpa* Mc Alp.

Transvaal.—Duiwelskloof, Politsi, Tzaneen, Nelspruit and Barberton (lowveld).

No Black Spot could be found on the 1945 crop at Umkomaas Valley and at Nkwalini, although it was present on the 1944 crop. Two growers at Duiwelskloof stated that they had known the disease for some eight years on their properties and that in 1938 it had caused severe losses.

Preliminary Investigations.

Black Spot disease has been investigated during the past two seasons but the severe drought has practically nullified this year's experiments. The results may be briefly summarized, however, as follows:—

Spraying Experiments.—Experiments at Pietermaritzburg and at Richmond* have shown that the disease can be adequately prevented by spraying with full strength commercial Bordeaux mixture (= 4-4-50), starting at petal drop, and with two subsequent sprayings at 6-weekly intervals.

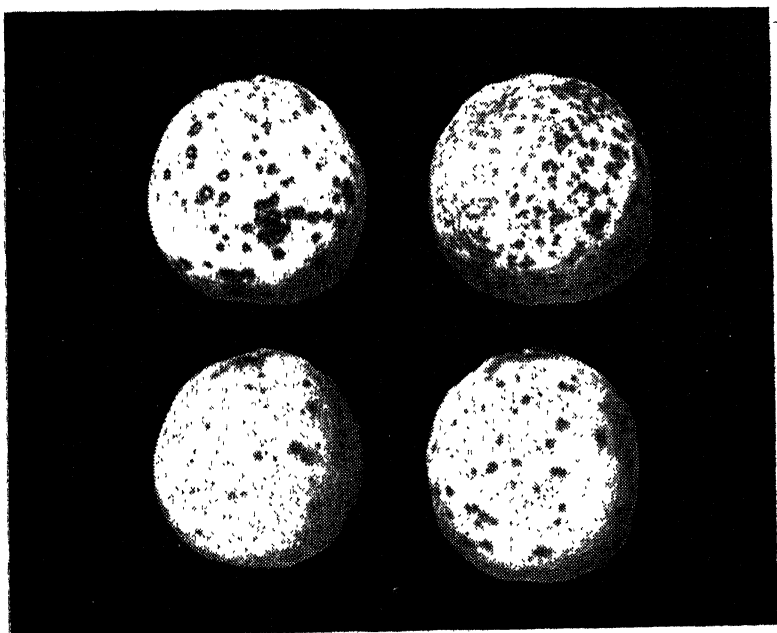


FIG. 2.—Two sprayings of full-strength Bordeaux mixture at Pietermaritzburg partially controlled the disease. The fruits were only slightly affected (below) whereas most of those on the unsprayed trees showed severe infection (above).
[Photos: V. A. Wager.]

Damage to Trees.—This treatment cannot be recommended, however, for it had deleterious effects on the trees. It caused a considerable amount of leaf fall, so that even after a year the trees looked sparsely foliated. The sprayed trees also showed wilting during spells of dry weather, whereas the controls did not. The most interesting effect, however, was on the fruits which were very

* With the very kind co-operation of Messrs. S. L. English and C. R. English.

slow in colouring-up as compared with the controls. By early spring the sprayed fruits were light yellow, whereas those on the controls were a dark orange. Subsequently the sprayed fruits turned back to a grass-green colour and were coarse and insipid in taste.

Effect on Scale.—Scale insects on the sprayed trees multiplied exceedingly. In the mist-belt areas where scale control was previously not necessary, it will now have to be carried out.

Does Black Spot develop in Transit?—Preliminary experiments have shown that no new spots developed while fruits were kept in cold storage for periods varying from one to five weeks. Spots rapidly developed, however, on these same fruits which were then exposed to room temperatures.

Future Experimental Work.

Experiments now in progress have been planned with the co-operation of the Divisions of Horticulture and Entomology to produce information on the following points:—

Will Bordeaux spray at the recommended one-quarter strength (=2-2-80) control the disease and have no toxic effect on the trees?

Other sprays such as Copper Hydro, Copper Zinc, and Copper Lime Zinc (1-5-4-100) are being tested as a preventative of the disease.

The problem of scale increase is being investigated especially to discover what period should elapse before a sprayed tree can be fumigated without resultant injury.

Classing of Poultry :—

[Continued from page 742.]

for breeding purposes. Poultry farmers should mark each season's chicks regularly, so that it may be possible to determine the age of each hen when she is handled. This is best done by making a V-shaped cut in the membrane between the chick's toes. Chicks of the same season should be marked in the same way.

Summary of Recommendations.

The foregoing points are summarized in the following chart:—

Character.	JUDGING LAYING HENS.	
	<i>Hen in Production.</i>	<i>Hen out of Production.</i>
Comb.....	Red, large, full and waxy.....	Small, pale and scaly.
Lobes and Wattles.....	Large, soft and smooth.....	Small, coarse and dry.
Pelvic Bones.....	Flexible and widely apart.....	Rigid and closed.
Vent.....	Large, oblong, and moist.....	Small, shrunken, round, and dry.

JUDGING FOR PRODUCTION IN THE PAST.

	<i>Long laying period.</i>	<i>Short laying period.</i>
Vent.....	Pale white.....	Dark flesh colour.
Eye-lids.....	Thin with white edges.....	Thick and slightly yellow.
Eye.....	Prominent, lively and bright..	Listless and sunken.
Earlobes.....	Enamel white.....	Yellowish.
Beak.....	Pearly white.....	Yellowish.
Face.....	Clean and smooth.....	Full and yellowish.
Shanks.....	White, flat and thin.....	Yellow and round.
Plumage.....	Compact, dry and dull.....	Loose, showing signs of moult.

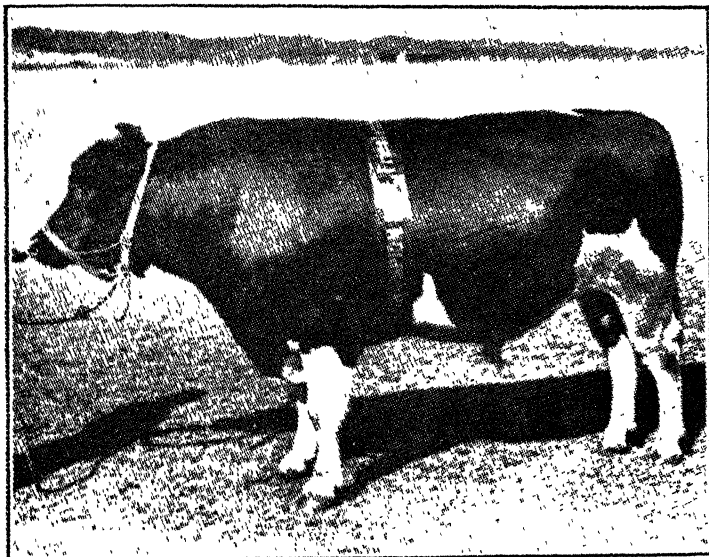
JUDGING INTENSITY.

	<i>High Intensity.</i>	<i>Low Intensity.</i>
Skin.....	Soft, loose, thin and silky....	Thick, dry with layers of fat underneath.
Breastbone.....	Slopes downwards.....	Slopes upwards.
Pelvic Bones.....	Thin, straight.....	Thick and curved inwards.
Capacity.....	Four to five finger-widths.....	Less than three finger-widths.
Abdomen.....	Soft and open.....	Hard, covered with fat.
Back.....	Broad and width extending far back.	Narrow and converging to a point.

The Breeding Value of Friesland Bulls in South Africa.*

Dr. F. N. Bonsma, Department of Animal Husbandry, Agricultural Research Institute.

(6) SJIRK 9165/7 (32/2011 F.R.S.K.)



SJIRK.

Date of Birth: 26 October 1928.

Died: 1937.

Breeder: J. D. Kuperus, Marssum, Holland.

Owner: Messrs. E. T. Hill & Son, "Came", Seven Oaks, Natal, and R. L. Gilson, "Kliprug", Kokstad.

Score: 82.2 points in South Africa.

Sjirk was imported in December 1929 by Messrs. E. T. Hill and Son. He was extensively used in the "Came" herd until July 1934, when he was transferred to Mr. R. L. Gilson, who used him in the Kliprug herd until the animal died in 1937.

Eighty male and eighty-one female calves were born to Sjirk, of which 23 bulls and 44 cows were registered in the Friesland Herd book. (Information supplied by Friesland Breeders Association.)

Pedigree.

Stiensers LXVII, 16683.....	{ Jonge Pel Rooske, 14000.	{ Pel Jan II, 10044 F.R.S.
		{ Rooske, 37733.
Sjirkje XXXIII, 65088.....	{ Stiensers LXVII, 49629....	{ Hans, 11317 (Pref.).
		{ Stiensers LXI, 41220.
	{ Roland Jan, 12474.....	{ Ferdinand, 9131.
		{ Leeuwarder LXXXII, 38197.
	{ Sjirkje XXXI, 47683.....	{ Susanna's Jan, 9802.
		{ Sjirkje XIX, 32338.

* This article is the fourth of a series, the 1st, 2nd and 3rd having appeared in the April June and September issues (1946) of *Farming in South Africa*.

Production of Dams and Granddams.

	Age.	Milk.	B.F. %	Days.
		lb.	%	
Dam.....	2	12,118	3.99	329
	2	10,305.9	3.69	317
	3	10,815.0	3.73	317
Sire's dam.....	5	13,467.9	37.9	319
	6	12,989.4	3.82	318
Dam's dam.....	5	11,468.3	3.80	308

From the pedigree of Sjirk it will be seen that he is a grandson of Jonge Pel Rooske, which was imported by Baynesfield Estates and extensively used in the Nelsrust herd. Through his sire, Sjirk is descended from the well-known line of preferent bulls, Jan II 4617, Jan 3540 and Albert 13064. His granddam on his sire's side is a daughter of the preferent bull Hans 11317, a line-bred Gerard 6808—Nico 4969—Jan 3265 bull.

Sjirk is also a descendant of the Jan 3265 line of preferent bulls through his grandsire Roland Jan 12474. It will, however, be seen that Sjirk is not a line-bred bull.

Analysis of Data.

From the available data it was possible to compare 44 dam-daughter production records, of which 18 were produced in the "Came" herd and 26 in the "Kliprug" herd.

The farm "Came" is situated near Seven Oaks in the mist belt of the Greytown district in Natal. From a climatic and environmental point of view the area is favourable for the breeding of Friesland cattle, and is also well suited to the production of fodder crops and the establishment of artificial pastures.

The "Kliprug" farm is situated near Kokstad in the Drakensberg sourveld of East Griqualand and is one of the best known dairying areas in South Africa. Climatically it is well suited to Friesland cattle.

The milk records of practically all the dams and their daughters were produced under the conditions prevailing at "Came" or "Kliprug", and were therefore comparable from the point of view of environmental conditions.

Daughter-Dam Comparisons.

A comparison of the average age-corrected two-year-old milk production and of the butterfat percentages of the available 44 daughters and their 32 dams is shown in the following table.

Milk Yield and Butterfat Percentage.

Daughters (44).	Dams (32).	Average increase or decrease in milk yield of daughters.	Percentage of daughters which show an improvement on their dams.	STATISTICAL SIGNIFICANCE.	
				P < .01.	P < .05.
9,120.6 lb.	8,508.4 lb.	MILK YIELD. + 612.2 lb.	66%	Not sig.	Not sig.
3.45%	3.33%	BUTTERFAT P +0.12%	70.5%	Not sig	Sig.

BREEDING VALUE OF FRIESLAND BULLS IN SOUTH AFRICA.

The distribution of the individual dam-daughter comparisons for the age-corrected milk yield and of the butterfat percentages is graphically presented in figures 1 (a) and 1 (b). The comparisons from the "Came" herd have been plotted as dots (Nos. 1-18), whereas stars have been used for the data from the "Kliprug" herd (Nos. 19-44).

The analyses of the dam-daughter comparisons for the two herds are shown separately in the following Table.

A "Came" Herd.

Daughters (18)	Dams (13).	Average increase or decrease in milk yield of daughters	Percentage of daughters which show an improvement.	STATISTICAL SIGNIFICANCE.	
				P < .01.	P < .05.
8,765.2 lb.	7,285.3 lb.	MILK YIELD. +1,479.9 lb	83.3%	Sig.	Sig.
3.58%	3.39%	BUTTERFAT PERCENTAGE. +0.19%	83.3%	Sig.	Sig.

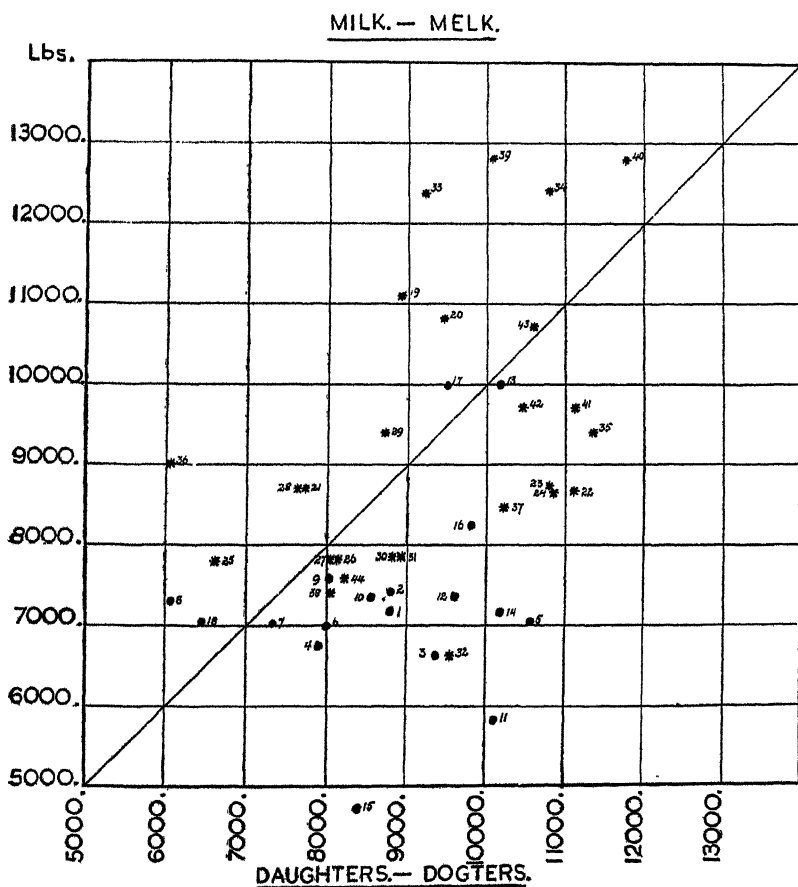


FIG. 1 (a).—Daughter-dam comparison for milk yield on 2-year-old basis.

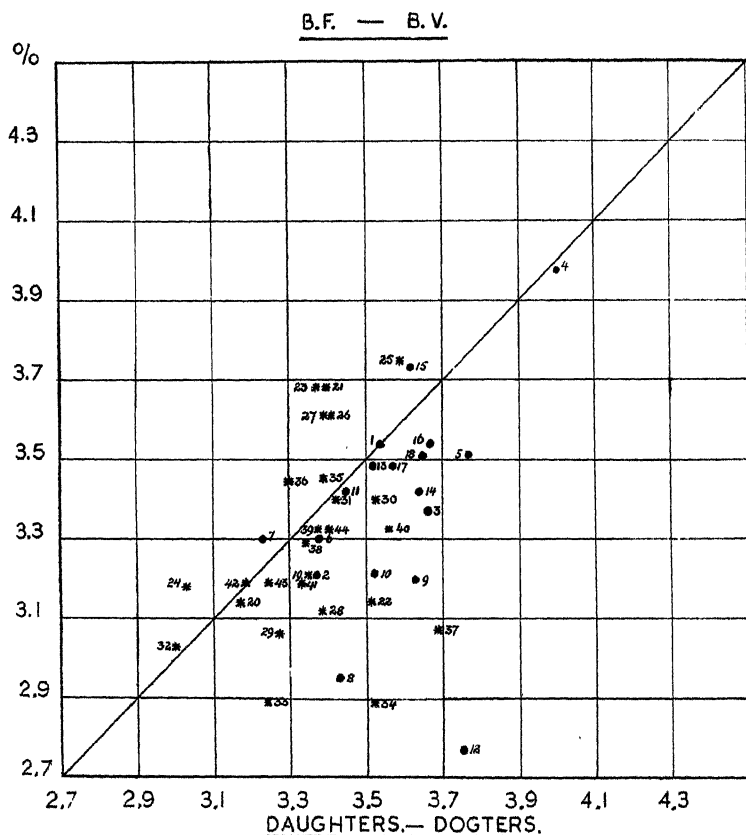


FIG. 1 (b).—Daughter-dam comparison for butter fat percentage.

B. "Kliprug" Herd.

Daughters (26).	Dams (19).	Average increase or decrease in milk yield.	Percentage of daughters which show an improvement.	STATISTICAL SIGNIFICANCE.	
				P < .01.	P < .05.
9,366.8 lb.	9,355.2 lb.	MILK YIELD. +11.6 lb.	53.8%	Not sig.	Not sig.
3.36%	3.30%	BUTTERFAT PERCENTAGE +0.06%	61.5%	Not sig.	Not sig.

Conclusions.

From the results of the analyses presented in the above tables it will be seen that the Sjirk daughters, as compared with their dams, showed an appreciable average increase of 612 lb. in milk yield. The difference was, however, not statistically significant. In the "Came" herd a significant ($P < .01$) average improvement of 1479.9 lb. of milk in favour of the Sjirk daughters was recorded. No less than 83% of his daughters were higher producers than their dams.

In the "Kliprug" herd the average difference in production between the daughters and their dams was insignificant. The Sjirk daughters, however, maintained the comparatively high level of production of the herd with an average two-year-old production of 9366.8 lb.

BREEDING VALUE OF FRIESLAND BULLS IN SOUTH AFRICA.

OFFICIAL SCORE OF.....SJIRK.....										
	Head.	Neck, Chest, etc.	Crops, Ribs, etc.	Hips, etc.	Thighs, etc.	Hocks, etc.	Udder, etc.	Skin, Hair, etc.	Character and True- ness to Type.	General Appear- ance.
OFFICIAL SCORES OF FEMALE PROGENY.										
A										
AB										
AB—										
B+										
B	6	2	9	2	38	1	5	44	4	3
B—	1	4	3	1	4	2	8		6	4
BC+	10	19	20	4	2	5	17		25	17
BC	24	19	12	31		36	13		8	18
BC—	2			5			1		1	1
C+	1			1						1
C										
CD										
TOTAL SCORES. 75.6, 74.8, 70.8, 79.1, 72.8, 72.2, 79.2, 71.6, 73.0, 73.4, 75.3, 70.7, 74.3, 70.2, 78.9, 75.2, 74.1, 75.5, 73.5, 74.4, 71.9, 74.1, 71.9, 75.2, 77.0, 73.5, 74.1, 71.9, 72.6, 74.0, 73.5, 71.1, 70.1, 71.8, 74.4, 73.4, 72.9, 73.9, 71.9, 71.6, 74.4, 73.7, 72.6, 71.5.										

Average 73.58.

FIG. 2 (a). Official scores of female progeny of Sjirk.

The Sjirk daughters showed a significant ($P < .05$) increase of 0.12 per cent. butterfat as compared with their dams. Seventy per cent. of his daughters showed an improvement in their butterfat percentage, i.e. in 31 out of the 44 dam-daughter comparisons. It is interesting

b	b	b+	b+	b	bc+	b+	b+	b	82.2
Head and Horns.	Neck, Chest, etc.	Crops, Ribs, etc.	Hips, etc.	Thighs, etc.	Hocks, etc.	Milk Indication.	Character and Trueness to Type.	General Appearance.	
OFFICIAL SCORES OF MALE PROGENY.									
									A
									AB
									AB-
1							1		B+
2	1	2		21	1	20	1	1	B
	2		1	2		2		2	B-
6	12	12	4		4	1	16	10	BC+
12	8	9	18		18		5	9	BC
2								1	BC-
									C+
									C
									CD
SCORES. 73.6, 78.8, 73.9, 78.5, 71.1, 73.7, 74.5, 74.8, 71.9, 74.9, 71.1, 74.3, 73.5, 72.8, 70.7, 74.9, 73.6, 73.5, 74.9, 73.0, 72.6, 72.6, 72.5,									

Average 72.73

Fig. 2 (b). Official scores of male progeny of Sjirk.

to note that, although the average butterfat percentage of the cows to which he was mated in the "Came" herd, was higher than that of the cows in the "Kliprug" herd, a significant ($P < .01$) improvement was recorded in the firstmentioned herd, whereas the increase in the butterfat percentage in the "Kliprug" herd was negligible.

Notwithstanding the apparent differences in the results obtained in the two different herds in which Sjirk was used, the conclusion can be drawn that he bred consistently well for high milk yield. This is evident from the comparative uniformity of production of his daughters in both the "Came" and "Kliprug" herds. The appreciable improvement in production observed in the "Came" herd is no doubt due to the considerably lower average level of production of the dams in the "Came" herd as compared with that in the "Kliprug" herd.

The average age-corrected two-year-old production of 9120.6 lb. for all the Sjirk daughters must be considered as very satisfactory, particularly in view of the lack of uniformity of the breeding of the cows on which he was used. Sjirk was bred to cows out of no less than 17 different sires. It was consequently impossible to analyze the influence he had on the daughters of any particular sire.

Although the Sjirk daughters showed a significant increase in their average percentage butterfat as compared with their dams, it cannot be claimed that he possessed the hereditary qualities of transmitting a high butterfat percentage. The average butterfat percentage of 3.45% for all his daughters can be regarded as satisfactory, but it is not above the average for the breed.

Finally it can be concluded that Sjirk bred very well in the "Came" herd, and was responsible for a marked improvement in both milk yield and butterfat percentage, whereas he maintained the standard of production in the "Kliprug" herd.

Analysis of the Conformation of the Progeny of Sjirk.

From the data supplied by the Friesland Breeders Association, official score cards of 23 males and 44 females were available for analysis. The analysis of the data of the male and female progeny is shown in figures 2 (a) and 2 (b), respectively.

From the data thus presented it will be seen that the average score of the male progeny was 73.73, and that of the female progeny 73.58.

Generally speaking, Sjirk's female progeny are fine deep cows with fairly good hindquarters and show excellent quality. On the whole they have good udders and the milk indications are excellent. From the analyses of the score cards it will be seen that Sjirk bred few really outstanding animals, not one of his progeny scoring 80 points. On the other hand, if the heterogeneous breeding of the cows to which he was bred is taken into consideration, the conclusion can be drawn that he bred a very good utility type of dairy cow.

He was responsible for a marked improvement in conformation, particularly in the "Came" herd.

Millepedes or Thousand-Legs.

E. E. Anderssen, Entomologist, Department of Agriculture.

MILLEPEDES or thousand-legs are closely related to centipedes or hundred-legs. They differ from them in several features, however; their bodies are more tubular, they have two pairs of legs to each body-segment instead of one, and only some of them are venomous. Neither millipedes nor centipedes are insects, but are near relatives of insects in the same way as are spiders, ticks and scorpions. Since they are not true insects, their habits have not been particularly investigated nor measures of control very thoroughly studied by entomologists in South Africa or abroad.

Millepedes have become of considerable economic importance in recent years, however, on crops like potatoes, beetroot, carrots, turnips and commercial flowering crops belonging to the family Liliaceae, damage being reported to an increasing extent.

Although the Transvaal species of millepedes as such are a problem and no 100 per cent. effective measure for their control has as yet been worked out, a number of suggestions can be offered, and, if these are applied systematically, relief is considerable.

In the first place, it should be remembered that infestations build up from a few individuals appearing in any one space. These lone individuals lay eggs in the soil and so the population is built up to pest proportions within a few seasons. The rate of increase depends largely on the promptitude of action by the grower.

It should be the policy to destroy any such lone individuals whenever and wherever they are found, and in this way avoid any nucleus from developing. Because of this "lone" appearance of individuals it will be found in practice that infestations appear localized at first, and afterwards, as the numbers increase, the dispersal becomes more general, until finally the soil simply teems with their numbers. At this stage large-scale damage usually results to whatever crop happens to be present. Although grasses are also attacked, the damage there is not so evident. It is with potatoes and other underground root crops that damage usually becomes a consideration.

In addition to the policy of destroying lone individuals, baiting can also be practised, but while the infestation is still in the localized condition, much good can be done by isolating the patch concerned by means of furrows with at least one upright side which should face the infestation. In the furrow so drawn pitfalls with overhanging walls are dug at frequent intervals. These act as traps for millepedes which find their way into the furrow. Destruction of these trapped creatures should be frequent (every few days) otherwise they are liable to escape by burrowing into the walls of the pitfalls and so reach the surface again.

Baiting is an eleventh hour measure and is only applied where population density has built up and is already heavy.

Millepedes hibernate in the soil and hardly feed at all during winter, and very rarely appear during the cold months, so that activity is reduced to a minimum and baiting cannot thus be applied with effect. During summer, however, millepedes take a bait quite readily and any of the following carriers can be soaked for 12 hours in a saturated solution of sodium fluosilicate, e.g. plus minus 2 ounces to 4 gallons of water. Cut-up waste potatoes, vegetables, fruits, etc. act as carriers. The poisoned bait should be broadcast where millepedes abound and preferably on bare land a few days before the crop is put in. Baiting should be repeated if rain falls sooner than 24 hours after placing the bait.

Crops and Markets

A Statistical and Economic Review of South African Agriculture

by

The Division of Economics and Markets

Volume 25

NOVEMBER 1946

No. 291

CONTENTS

	PAGE.
Price Review for September, 1946	781
Index of Prices of Agricultural and Pastoral Products	782
Agricultural Conditions in the Union during September, 1946.	782
Chicory Prices for the Season 1946/47.	783
Sales of Eight Vegetable Varieties on Eight most Important Municipal Markets in the Union.	783
The Wool Market.	786
Index and Price Tables.	787

Price Review for September, 1946.*

Deciduous Fruit.—Supplies of apples, the only deciduous fruit on the market, gradually decreased, and, owing to the poor quality, prices were lower than those of the previous month.

Citrus Fruit.—Lemons and grapefruit were scarce, and the supply was insufficient. Oranges were fairly plentiful, but the demand exceeded the supply.

Tropical Fruit.—The markets were well supplied with papaws, and prices decreased considerably:—on the Cape Town market from 5s. 1d. per box in August to 2s. 10d. per box in September; on the Johannesburg market from 4s. 4d. to 2s. 8d.; on the Port Elizabeth market from 4s. 9d. to 2s. 3d., and on the Bloemfontein market from 4s. 4d. to 2s. 11d. Fair quantities of guavas and grenadillas were offered and good prices were realized. The supplies of pineapples increased towards the middle of the month and sold well. Avocados were scarce and dear.

Tomatoes.—Large consignments reached the markets and good quality tomatoes sold well at higher prices than those of the previous month.

Vegetables.—Cabbages and carrots were supplied in particularly large quantities. The supplies of green beans and green peas also increased during the month. Cauliflower consignments decreased, and prices gradually increased. Pumpkins were exceedingly scarce and very dear.

Potatoes.—The demand for good quality potatoes was keen and maximum prices were realized.

* All prices mentioned are averages.

Onions and Sweet Potatoes.—The supply of onions decreased and prices increased considerably. On the Johannesburg market Cape onions increased from 17s. per bag in August to 25s. 3d. per bag in September; on the Cape Town market from 13s. 7d. to 20s. 4d.; on the Pretoria market from 15s. 10d. to 23s. 2d.; and on the Durban market from 18s. 7d. to 23s. 3d. Sweet potatoes were also scarce and dear.

Fodder.—Teff and sweet grass consignments of poor quality were plentiful on the Johannesburg market, but the demand was poor. Other fodder varieties were hardly obtainable.

Poultry and Poultry Products.—The supply of eggs increased in comparison with that of the previous month, and prices decreased. Small poultry consignments reached the markets, and were disposed of readily.

Index of Prices of Agricultural and Pastoral Products.

THIS index (see table elsewhere in this issue) showed a considerable increase for September in comparison with the previous month, namely, from 180 to 196.

This increase is ascribed especially to the increase in the prices of wool which came into operation at the commencement of the new wool season at the beginning of September. The index of the group "Pastoral products", of which wool is the most important, also increased from 120 to 163.

The old system of public auction was reverted to at the commencement of the new wool season, except that a reserve price is being maintained (in this connection see article on the wool market elsewhere in this issue). The demand for wool, especially for the best types, was so keen that prices immediately increased above the average prices of the previous season. Towards the end of September the maximum prices of hides were again increased, which also to a slight degree accounted for the increase in the index of this group.

The index for "Slaughter stock" also again increased, namely, from 175 to 182 in September, as a result of the increase in the seasonal prices of slaughter stock in the controlled areas.

The index for "Other agricultural products" also increased, namely, from 324 to 356 in September, particularly as a result of the increase in the prices of potatoes. From the middle of August the maximum prices of potatoes were increased as usual, in order to compensate producers of winter potatoes for their relatively higher production costs. The prices of sweet potatoes and onions all increased.

The only decrease occurred in the group "Poultry and poultry products", namely, from 182 to 175, as a result of the further seasonal decrease in the prices of eggs.

N.B.—On the basis of new and better information at present available the indexes of winter cereals, slaughter stock, and poultry and poultry products will shortly be revised, and the revised indexes will probably appear in the next issue of *Crops and Markets*.

Agricultural Conditions in the Union during September, 1946.

Rainfall.—The western and south-western parts of the Cape Province experienced good rains. Scattered showers also occurred in the Karoo and Natal, but in the rest of the Union it was dry, and rain is urgently needed.

Grazing.—As a result of the general drought grazing deteriorated and became scarce.

Condition of stock.—In general the condition of stock is still reasonable. Nagana is still causing stock losses in Natal, and lumpy skin disease is still prevalent.

Crops.—The prospects for winter cereals are still favourable, but rain is urgently needed in all parts to improve conditions.

Chicory Prices for the Season 1946/47.

THE prices at which producers may sell chicory during the season 1 October 1946, to 30 September 1947, have been fixed at:—

- 36s. per 100 lb. for 1st grade dry chicory root;
- 30s. per 100 lb. for 2nd grade dry chicory root;
- 25s. per 100 lb. for 3rd grade dry chicory root.

These prices are free on rail producer's station, and may again be increased by 2d. per 100 lb. per month as from 1 November 1946.

The corresponding price of 1st grade chicory during the past season was 35s. per 100 lb., while the prices of 2nd and 3rd grade remained the same.

Sales of Eight Vegetable Varieties on Eight most Important Municipal Markets in the Union.

IN the October 1945 issue of *Crops and Markets* particulars were given of the quantities and values of eight important vegetable varieties sold on the eight most important municipal markets in the Union, namely, the municipal markets of Johannesburg, Pretoria, Bloemfontein, Cape Town, Port Elizabeth, East London, Durban and Pietermaritzburg. The eight vegetable varieties were potatoes, onions, sweet potatoes, tomatoes, green beans, green peas, cabbages and cauliflowers.

The data were in respect of the years 1937 to 1944, and in the tables below the corresponding particulars for 1945 are now given.

The total yearly quantities and values of the eight vegetable varieties which were sold by public auction on the eight municipal markets in the Union were as follows:—

Year.....	1939	1940	1941	1942	1943	1944	1945
Quantities sold ('000 ton)....	180.5	182.2	194.4	230.8	274.3	214.7	243.8
Values (£'000).....	1,020	1,507	2,194	2,491	3,008	3,269	3,800

Although the *volume* of sales in 1945 did not again reach the peak of 1943, it was nevertheless considerably higher than in 1944, and higher than in any other year except 1943.

The increase in the *value* of the sales continued in 1945, and was more than £500,000 higher than the total value of 1944, when the values, notwithstanding a comparatively small volume, nevertheless reached a peak.

Quantities and values of each vegetable variety sold on eight municipal markets.

(a) Quantities (1,000 lb.).

Year.	Potatoes.	Onions.	Sweet potatoes.	Tomatoes.	Green beans.	Green peas.	Cabbages.	Cauliflowers.
1939.....	201,781	36,749	14,771	43,085	14,112	14,950	29,478	6,042
1940.....	202,259	34,611	16,585	45,458	15,461	15,479	28,767	5,875
1941.....	209,705	40,389	19,955	51,921	15,915	14,019	30,913	5,966
1942.....	249,703	43,303	19,562	63,232	17,084	17,902	43,653	7,099
1943.....	336,275	46,492	23,843	49,562	17,931	18,388	47,002	9,078
1944.....	175,263	50,955	30,169	76,197	19,552	18,745	49,500	9,049
1945.....	220,699	54,695	33,352	85,619	18,740	17,500	49,465	7,624

(b) Value (£1,000).

Year.	Potatoes.	Onions.	Sweet potatoes.	Tomatoes.	Green beans.	Green peas.	Cabbages.	Cauliflowers.
1939.....	443.1	114.4	28.6	199.2	72.8	89.4	56.1	16.3
1940.....	760.5	168.9	39.0	247.6	86.7	102.5	82.2	19.2
1941.....	1,227.5	186.3	61.4	333.7	113.7	124.2	123.1	24.2
1942.....	1,357.2	229.9	64.6	394.9	125.5	139.7	157.4	31.7
1943.....	1,469.9	289.7	86.4	514.7	174.9	203.7	219.4	49.2
1944.....	1,237.6	351.5	199.4	704.9	214.3	236.2	269.1	56.1
1945.....	1,741.6	341.2	165.6	782.3	206.0	238.9	269.4	55.4

It appears that the quantity of onions, sweet potatoes and tomatoes sold, continually increased, and reached a further peak in 1945. Although considerably more *potatoes* were sold in 1945 than in the previous year, the total volume still did not reach the peaks of 1942 and 1943. The drought, poor quality seed potatoes and the shortage of fertilizer were causes which kept the potato sales relatively low. In comparison with 1944 less green beans, green peas, cabbages and cauliflowers was marketed in 1945.

As regards the *values*, it appears that onions and sweet potatoes, notwithstanding larger quantities, realized lower values in 1945 than in 1944. The prices of sweet potatoes, which to a large extent were also influenced by those of potatoes, reached exceptionally high levels in 1944, chiefly as a result of the shortage of potatoes. The sale of sweet potatoes in that year realized a value of almost £200,000. In 1945 with a larger supply of potatoes and also sweet potatoes on the markets, the prices of sweet potatoes were much lower than in 1944. The decrease in the value of onion sales is probably to a large extent due to the larger supply. In the case of tomatoes, however, the total value of the sales was approximately £77,000 more than in 1944, as a result of a comparatively stable demand for tomatoes throughout the year, in spite of a large supply. The value of *potato* sales reached the record peak of more than £1.7 million in 1945. This was approximately £270,000 more than the total value which was realized in 1943 by a considerable larger quantity of potatoes.

The value of green peas and cauliflowers, in spite of the smaller quantities sold, was slightly higher in 1945 than in 1944; whilst green beans and cabbages showed a decrease in value together with a decrease in the quantities.

CROPS AND MARKETS.

Quantities and values of eight vegetable varieties sold on each of the eight municipal markets.

(a) Quantities sold (1,000 ton).

Year.	Pretoria.	Johannesburg.	Bloemfontein.	Cape Town.	Port Elizabeth.	East London.	Durban.	Pietermaritzburg.
1937.....	10.5	74.3	4.6	23.0	9.4	5.5	14.7	3.7
1938.....	12.5	79.6	5.5	25.0	10.9	5.9	15.9	7.1
1939.....	13.6	84.1	5.6	32.6	12.3	6.3	18.4	7.5
1940.....	14.5	85.4	4.5	34.7	11.0	5.4	19.5	7.1
1941.....	16.3	87.6	4.1	39.7	10.9	4.6	24.0	7.2
1942.....	20.1	100.9	5.0	50.2	12.5	6.7	26.8	8.6
1943.....	24.0	131.2	6.5	50.6	13.5	7.0	31.5	10.0
1944.....	19.9	102.3	5.7	44.6	10.7	5.5	19.7	6.3
1945.....	24.1	121.1	7.9	43.6	9.3	4.9	24.2	8.8

(b) Value (£1,000).

Year.	Pretoria.	Johannesburg.	Bloemfontein.	Cape Town.	Port Elizabeth.	East London.	Durban.	Pietermaritzburg.
1937.....	77.7	559.2	34.8	179.6	68.6	35.9	107.0	30.2
1938.....	79.2	505.7	36.5	176.0	72.5	37.5	107.2	44.3
1939.....	74.2	454.8	32.7	198.5	71.8	37.7	107.1	43.0
1940.....	119.9	692.4	37.4	301.4	91.2	40.1	166.4	58.0
1941.....	186.6	992.6	45.6	447.7	122.9	51.2	268.4	79.2
1942.....	214.2	1,074.7	52.1	564.5	133.3	61.4	297.0	93.5
1943.....	264.6	1,421.9	70.4	577.5	150.5	78.3	333.0	111.8
1944.....	291.3	1,532.5	88.4	687.2	154.8	79.8	330.1	105.1
1945.....	377.2	1,850.7	120.0	693.2	152.1	91.5	378.8	136.9

From the above it appears that the sales on the municipal markets of the three coastal towns, namely, Cape Town, Port Elizabeth, and East London, were slightly less in 1945 than in 1944. The other municipal markets all show an increase in the total quantity sold over that of 1944. On the Pretoria market, for example, almost 4,000 tons more were sold; on the Johannesburg market almost 19,000 tons more, and on the Durban market 4,500 tons more. Except in the case of Pretoria and Bloemfontein the record quantities of 1943 were not exceeded on any of the markets in 1945.

on all markets except Port Elizabeth. Especially noteworthy was the increase in the quantity and value of sales on the Pretoria market from 1937 onwards, so that sales there now practically equal those on the Durban market. If the quantities marketed in 1945 are expressed as a percentage of the average quantities of the pre-war years 1937 to 1939, then the sales on the separate municipal markets increased as follows:—Pretoria, 97 per cent.; Cape Town, 62 per cent.; Johannesburg, 53 per cent.; Bloemfontein, 51 per cent.; Durban, 49 per cent.; and Pietermaritzburg, 43 per cent.; while Port Elizabeth and East London showed decreases of 14 per cent. and 16 per cent., respectively.

(A. J. du Plessis.)

The Wool Market.

ACCORDING to the Wool Purchasing Agreement between the Governments of Great Britain and the Union of South Africa all wool was purchased by the British Wool Commission during the war and until the end of the 1945-46 season.

From the beginning of the 1946-47 wool season the open market was again introduced and all wool is again being offered by public auction at the four Union ports, as was the case in pre-war years.

In order to effect the orderly disposal of accumulated wartime surpluses of wool and at the same time maintain an appropriate degree of price stability, a new Wool Agreement has been concluded between the Governments of the United Kingdom, Australia, New Zealand and South Africa. A Joint Organization, known as the United Kingdom Dominion Wool Disposals, Limited, has been inaugurated for this purpose.

In terms of this new wool agreement, as ratified by the Parliament of the Union in the Wool Act of 1946, the four Governments concerned have given consideration to the recommendations of the Joint Organization and have agreed to maintain the average selling price (*ex store*) of wool at the same level as that of the past wool season (1945-46).

In order to cover the costs of the scheme a wool levy has been imposed. Originally it was considered that a levy of 13 per cent. would be necessary for this purpose, but as a result of the heavy demand for Union wool during the 1945-46 season, partly due to the effect of the drought on the Australian clip, the stock position of Union wools has changed considerably from what it was in June 1945. Instead of a 13 per cent. levy originally contemplated, it has been found possible to reduce the levy to 7½ per cent. This levy (of 7½ per cent.) actually came into effect as from 1 July 1946.

As the average reserve price at auctions is to be the same as the average (*ex store*) selling price of the previous season, a levy of 7½ per cent. of the selling price means that the producer's price will be increased by 5½ per cent. above that of the previous season together with any increase in price above the reserve price which the wool may realize on the open auction market. The average margin between producer's price and *ex store* selling price was 13 per cent. in the previous season.

The Joint Organization will thus endeavour to dispose of all the accumulated war-time war surpluses in an orderly manner by offering these for sale by auction alongside new clips in accordance with the supply and demand on the world market. Furthermore, it will be prepared to buy in the wool of producers on auction sales at reserve prices in order to maintain an appropriate degree of stability.

During this year the Wool Council of the Union has also been reconstituted under the Marketing Act as the Wool Board, while the levy of 7½ per cent. will also include the levy payable to the Wool Board. The previous levy of 1s. per bale payable to the old Wool Council has been discontinued as from 1 July 1946.

Review of the Wool Market during September 1946.

The first auction sales for wool commenced at the beginning of September this year at the Union ports.

Altogether 19,154 bales were offered for sale, of which 78 per cent. were sold.

Offerings consisted mainly of Karoo and grassveld wools. At the outset, competition was particularly keen for super and best types. Free washing wool of all types also sold briskly. Karakul wools and

CROPS AND MARKETS.

inferior types, however, attracted very little attention. From about the middle of the month the demand showed a slightly weaker tendency, particularly as a result of a slackening in American demand.

The following are the average greasy wool prices per lb. realized during the month for the respective types:—

Highest price Super 12 months 70's and over quality wool, 28½d.

Spinners 64/70's quality:—

12 months	22½d.
10 to 12 months	21½d.
8 to 10 months	19½d.
6 to 8 months	17½d.

Comblings 64/70's quality:—

12 months	20½d.
10 to 12 months	18½d.
8 to 10 months	16½d.
6 to 8 months	15½d.

N.B.—The above prices are the straight averages between the lowest and highest prices realized for each type.

Average Prices of Green Beans, Green Peas and Carrots on Municipal Markets.

SEASON (1 July to 30 June.)	GREEN BEANS (Pocket 20 lb.).			GREEN PEAS (Pocket 20 lb.).			CARROTS (Bag). (a).		
	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.
1938-39.....	s. d. 1 8	s. d. 2 3	s. d. 2 0	s. d. 2 4	s. d. 1 9	s. d. 1 2	s. d. 3 8	s. d. 2 6	s. d. 6 1
1940-41.....	1 11	2 9	1 5	2 8	2 4	2 3	5 9	4 11	18 4
1941-42.....	2 7	3 10	2 6	3 11	3 8	3 4	8 5	8 11	17 2
1942-43.....	3 1	4 3	3 0	3 3	2 10	3 9	5 1	8 9	13 2
1943-44.....	3 8	4 11	3 0	4 11	4 10	4 11	9 11	11 1	20 2
1944-45.....	3 7	5 1	4 1	4 9	4 1	5 5	8 3	9 11	19 10
1945—									
January.....	1 10	0 11	2 4	4 3	1 9	6 7	7 7	3 1	10 2
February.....	1 7	3 4	2 3	5 5	6 9	7 4	7 8	6 11	19 1
March.....	2 3	4 11	2 6	7 7	12 0	6 7	9 5	6 3	25 4
April.....	1 11	2 8	1 10	4 4	6 6	4 0	8 6	13 9	19 6
May.....	3 3	5 3	2 3	5 9	9 11	3 1	9 5	8 7	21 6
June.....	4 3	4 2	5 0	4 9	7 9	3 8	10 0	10 10	13 9
July.....	9 10	7 10	5 10	8 2	11 7	8 8	10 1	16 4	20 11
August.....	7 4	6 4	6 10	5 8	7 10	5 5	13 4	17 11	12 11
September.....	3 1	5 9	4 1	2 8	4 1	2 4	7 5	12 8	16 8
October.....	3 8	5 4	4 9	4 4	3 6	7 7	9 6	9 10	20 11
November.....	1 6	3 4	2 4	9 0	4 0	9 4	9 8	8 8	16 4
December.....	2 4	2 3	2 8	12 1	—	12 5	10 9	7 10	13 10
1946—									
January.....	3 4	1 11	5 6	8 8	10 11	14 7	9 8	6 2	16 0
February.....	1 11	—	2 3	6 5	—	6 4	7 3	7 11	14 1
March.....	2 10	1 1	2 5	6 1	—	3 4	8 10	8 1	23 10
April.....	2 7	3 4	3 1	5 7	—	4 10	10 2	9 3	24 2
May.....	1 9	3 0	2 2	7 2	3 10	5 10	7 1	6 3	18 8
June.....	1 10	2 0	2 8	4 8	4 1	5 7	4 2	7 6	11 7
July.....	8 2	1 11	2 2	2 7	3 6	3 4	3 3	4 8	7 10
August.....	6 3	4 2	6 6	5 10	5 0	4 9	4 5	3 8	11 0
September.....	6 6	7 5	6 4	5 0	4 11	5 1	3 3	3 2	10 11

(a) Weights of bags vary, but on the average are approximately as follows:—Johannesburg, 180 lb.; Cape Town, 90 lb.; and Durban, 120 lb.

Index of Prices of Field Crops and Animal Products.

(Basic period 1936-37 to 1938-39 = 100.)

SEASON (1 July to 30 June).	Summer cereals.	Winter cereals.	Hay.	Other field crops.	Pastoral products.	Dairy products.	Slaughter stock.	Poultry and poultry products.	Com- bined index.
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)		
WEIGHTS.	19	13	2	3	34	6	17	6	100
1938-39.....	92	107	96	89	79	102	106	92	93
1939-40.....	86	107	77	95	115	105	108	89	103
1940-41.....	109	113	106	156	102	108	110	104	108
1941-42.....	121	134	143	203	102	131	134	145	123
1942-43.....	160	149	144	159	122	147	167	173	146
1943-44.....	169	172	137	212	122	154	182	204	157
1944-45.....	184	183	160	280	122	177	172	187	163
1945—									
January.....	184	183	177	250	122	159	173	206	163
February.....	184	183	171	235	122	180	171	225	164
March.....	184	183	182	245	122	180	171	237	165
April.....	184	183	173	246	122	180	169	263	166
May.....	199	183	173	237	122	184	163	272	170
June.....	199	183	190	320	123	184	170	262	172
July.....	199	183	191	315	118	210	175	210	170
August.....	199	183	191	333	118	210	179	180	169
September.....	199	183	187	372	118	210	183	165	170
October.....	199	183	189	383	118	210	187	165	171
November.....	199	190	194	379	118	204	187	173	172
December.....	199	190	194	341	117	204	183	202	172
1946—									
January.....	199	190	191	349	118	204	179	233	174
February.....	199	190	158	308	118	186	175	256	171
March.....	199	190	160	283	118	186	171	277	171
April.....	199	190	176	299	118	186	168	320	174
May.....	250	190	170	236	119	186	165	332	184
June.....	247	190	178	285	119	219	164	295	183
July.....	246	190	182	306	120	231	170	218	181
August.....	243	190	181	324	120	231	175	182	180
September.....	243	190	183	356	103	231	182	175	196

(a) Maize and kaffoorn.

(b) Wheat, oats and rye.

(c) Lucerne and test hay.

(d) Potatoes, sweet potatoes,
onions and dried beans.

(e) Wool, mohair, hides and skins.

(f) Butterfat, cheese milk and
condensing milk.

(g) Cattle, sheep and pigs.

(h) Fowls, turkeys and eggs.

Average Prices of Cabbages, Cauliflower and Tomatoes on Municipal Markets.

SEASON (1 July to 30 June).	CABBAGES (Bag). (a)			CAULIFLOWER (Bag). (a)			TOMATOES (Trays 15 lb.).			
	Johan- nesburg.	Cape Town.	Durban.	Johan- nesburg.	Cape Town.	Durban.	Johannesburg.			
							N.M. No. 1.	Other.	Cape Town.	Durban.
1938-39.....	s. d. 3 10	s. d. 3 0	s. d. 3 10	s. d. 3 0	s. d. 1 8	s. d. 3 5	s. d. 2 2	s. d. 1 3	s. d. 1 8	s. d. 0 10
1940-41.....	5 10	4 8	7 1	3 11	4 3	5 3	2 7	1 6	2 1	1 2
1941-42.....	8 10	5 5	11 5	5 9	5 7	7 11	3 1	1 9	2 3	1 6
1942-43.....	5 6	5 11	9 1	5 0	5 9	7 6	3 4	1 10	2 1	2 7
1943-44.....	11 1	7 4	17 6	9 2	6 2	12 1	5 5	2 9	3 7	2 0
1944-45.....	9 7	6 11	13 5	7 5	6 6	9 8	4 1	2 0	2 8	1 9
1945—										
January.....	8 0	4 9	15 8	6 3	—	—	6 1	2 6	2 7	2 2
February.....	7 8	8 6	22 4	9 5	6 11	—	3 0	1 2	3 1	1 1
March.....	8 5	10 5	24 1	8 8	—	8 0	3 4	1 5	2 5	2 4
April.....	8 7	7 11	14 8	7 7	9 7	11 4	3 4	1 5	2 6	1 7
May.....	7 6	5 4	11 2	7 3	6 5	10 10	4 0	1 10	2 4	1 10
June.....	8 11	4 3	10 6	11 7	7 7	14 10	8 11	2 1	3 0	1 1
July.....	12 2	5 4	11 0	12 3	5 7	11 0	3 7	1 10	2 9	1 2
August.....	12 0	9 7	8 11	10 0	8 2	12 3	5 2	3 2	3 4	1 5
September.....	12 2	11 7	10 8	11 8	9 6	14 10	6 7	3 1	3 10	1 10
October.....	10 1	12 1	16 3	17 0	5 9	11 0	6 2	2 8	3 1	1 8
November.....	10 9	9 11	16 0	12 9	8 6	—	5 7	2 8	4 0	1 6
December.....	14 2	9 10	17 7	26 0	3 6	—	3 0	1 1	3 11	1 1
1946—										
January.....	9 7	8 0	14 8	14 5	9 0	—	4 3	1 10	2 5	1 3
February.....	7 3	9 1	18 1	10 10	6 6	—	4 2	1 7	1 11	1 3
March.....	8 11	7 3	14 4	7 2	9 8	3 4	6 2	3 8	2 6	1 6
April.....	9 10	5 8	9 0	6 7	15 4	12 4	8 1	3 6	2 8	2 0
May.....	8 4	3 4	7 7	7 2	5 3	8 11	6 8	2 11	3 8	2 3
June.....	5 10	2 4	11 0	7 7	3 1	12 1	4 2	2 0	2 10	1 5
July.....	7 11	1 10	9 9	8 6	—	11 3	2 2	1 1	2 3	1 0
August.....	5 3	2 1	7 1	8 9	3 2	11 1	2 5	1 3	1 11	0 9
September.....	4 11	2 5	5 8	9 6	4 0	13 7	3 2	1 9	2 2	1 1

(a) Weights of bags vary, but on the average are approximately as follows: For cabbages—Johannesburg, 150 lb.; Cape Town, 105 lb.; and Durban, 80 lb. For cauliflower—Johannesburg, 100 lb.; Cape Town, 85 lb. and Durban, 85 lb.

CONTENTS



	PAGE
EDITORIAL:	
The Aims of the Division of Soil Conservation and Extension	791
FIELD HUSBANDRY:	
Dryland Lucerne and Soil Improvement in the Grain Areas of the Winter-Rainfall Area (Dr. J. H. Hofmeyr) ...	797
Summer Crops under Irrigation for Grazing and Hay Production (J. S. Starke)	803
FRUIT CULTURE:	
Melon-fly as a Pest of Grenadillas (F. J. Stofberg) ...	794
Hot Water Immersion of Oranges to Detect Minute Stings (H. F. Ehmke)	838
ANIMAL HUSBANDRY:	
The Horse on the Farm: IV Mechanics of the Horse (Dr. P. J. Schreuder and F. B. Wright)	825
Amyl Alcohol for Milk Testing (S. Bakalor)	843
Milch-Goats (N. G. Wessels)	845
GENERAL:	
Contouring by Farmers Themselves (N. J. van Straaten) ...	821
THE FARM HOME:	
The Preparation and Spinning of Wool (Miss S. Snyman)	847
CROPS AND MARKETS	853

Linlithgow Library.
Imperial Agricultural Research Institute,
New Delhi.

[NOTE.—Articles from *Farming in South Africa* may be published
provided acknowledgment of source is given.]

FORD'S FOR SEEDS—A. FORD & Co. (Pty.) Ltd.

AGRICULTURAL SEEDSMEN.

SEED CONTRACTORS TO THE UNION GOVERNMENT,
P.O. BOX 5701. CATALOGUES FREE JOHANNESBURG.

Information on Departmental Publications.

Farming in South Africa, the monthly journal of the Department, contains popular as well as scientific articles on a variety of agricultural topics, useful to both the farmer and the housewife, while the Crops and Markets Section supplies information on crop prospects, market prices and exports of agricultural produce.

The following particulars in regard to subscriptions and advertisements should be noted :—

Subscription.—Within the Union, South West Africa, Bechuanaland Protectorate, Southern Rhodesia, Swaziland, Basutoland, Mocambique, Angola, Belgian Congo, and British Territories in Africa, 5s. (otherwise 7s. 6d.) per annum, post free, payable in advance.

Applications, with subscriptions, to be sent to the Government Printer, Bosman Street, Pretoria.

Advertisements.—*The Tariff for Classified Advertisements is: 2d. (two pence) a word with a minimum of 5s. per advertisement (prepaid). Repeats, not entailing any change in the wording, will be published at half the cost of the original.*

Conditions:

- (1) The advertisement will be classified under specific headings, and only one black letter (initial letter) is permitted.
- (2) Advertisements in which prices are mentioned must contain the name and address of the advertiser. A nom-de-plume or box number only is not sufficient, and unless this condition is strictly observed, advertisements will not be accepted.
- (3) Advertisements will be classified strictly in accordance with the subject-matter of the announcement, determined by the first item mentioned and cannot be inserted under irrelevant headings.
- (4) Displayed, classified advertisements will also be accepted. The charge, however, will be 10s. per inch, single column, per insertion, without reduction for repeats.

Copy for Advertisements to be in the hands of the Government Printer, Pretoria, not later than the 20th of the month preceding publication.

Send all advertisements direct to the Government Printer, or write to him for details as to tariff for advertisements.

Popular Bulletins.—Bulletins on various agricultural topics are published by the Department to meet public demand. A list of available bulletins giving particulars of cost, etc., is obtainable free of charge from the Editor, Department of Agriculture, Pretoria.

Scientific Publications.—From time to time the different Divisions of the Department issue science bulletins incorporating the results of research work conducted by them. Other scientific publications issued are: "The Onderstepoort Journal", "Memoirs of the Botanical Survey of South Africa", "Bothalia", "Entomological Memoirs" and the "Annual Reports of the Low Temperature Research Institute". Information in regard to these publications is obtainable from the Editor, Department of Agriculture, Pretoria.

Press Service.—The Press of South Africa is now supplied with a bulletin of agricultural information for their exclusive use. This information is supplied to all newspapers and other journals throughout the country.

Farmer's Radio Service.—In addition to the printed information supplied by the Department to members of the farming community, the Department, in collaboration with the South African Broadcasting Corporation, also has a national broadcasting service for farmers. Information in regard to times of broadcasting is contained in the programmes issued by the Broadcasting Corporation.

Inquiries.—All general inquiries in regard to the above should be addressed to the Editor, Department of Agriculture, Pretoria.

D. J. SEYMORE, Editor.

FARMING IN SOUTH ... AFRICA

Vol. 21

DECEMBER 1946

No. 249

Editorial:

The Aims of the Division of Soil Conservation and Extension.

WITH the recent reorganization of the Department, the Division of Soil Conservation and Extension was created to give effect to the Government's declared policy of, first, making "conservation farming" a general practice in the shortest possible time, with a view to protecting and building up our soil and useful plant life, and conserving our water supplies and, secondly, making the South African farming industry more productive by raising the educational level of the farmer, encouraging more modern farming methods and improving the general efficiency of farmers and their labourers, and, consequently, their standard of living.

This development was the logical outcome of the introduction, in 1933, of schemes offering financial assistance and technical services for combating soil erosion. Under these schemes much useful work was done, but of a patchy nature, being spread over the numerous farms of the landowners who individually applied for assistance. Very useful experience was gained, however, during this pioneer stage, and in the course of the work carried out at pasture research stations, a number of which were also established at that time, significant results were obtained in regard to the use and potentialities of different types of veld. These results gradually threw more light on the problem of soil erosion.

In the beginning more attention was paid to methods for the mechanical reclamation of areas already subject to erosion, but as the biological aspects gradually came into prominence, it became increasingly apparent that correct methods of veld management are the best preventive measures, especially against surface erosion over the major portion of the country, which is suitable for stock farming only.

It also became clear that erosion of lands is caused by wrong methods of cultivation.

Progress in this direction led to the creation, in 1939, of the Division of Soil and Veld Conservation for the purpose of paying special attention to soil erosion, control effective veld utilization and weed eradication.

In spite of the difficult war years the Division made considerable progress, and realized that soil erosion is a problem intimately bound up with farming and not a separate, unrelated problem. Farmers are now recognizing the fact that soil erosion is a result and a demonstration of unsuitable farming practices, and they are realizing that the solution lies in the application of methods of soil and veld utilization or farming adapted to the prevailing soil, veld and climatic

conditions; in other words, that the farming system should be in ecological harmony with the area in which it is applied. In this way greater prominence has been given to the principles of conservation farming, viz. the development and application of farming systems and methods conducive to higher and more stable production per unit of area and *per capita* without overcropping and therefore without the consequent deterioration of agricultural resources such as soil, veld and water.

The war years represent a period of awakening in the sphere of conservation and the judicious utilization of our agricultural resources. Before 1939 only a very small percentage of our farmers, and an even smaller percentage of our urban population, paid serious attention to these matters. Towards the end of 1945, however, more farmers and city-dwellers began to demand purposeful action aimed at reclaiming eroded areas and at the general application of conservation farming.

The proclamation of conservation areas under the Forest and Veld Conservation Act of 1941 and the publication of the Departmental report on the "Reconstruction of Agriculture", at the beginning of 1944, together with the fourth report of the Social and Economic Planning Council, testify to the increasing attention now being paid by the Government to methods of farming and especially to soil erosion and soil conservation problems. Final proof of this active interest was the submission to the House of Assembly in 1946, of the "White Paper on Agricultural Policy" and the passing of the Soil Conservation Act.

The combination of the Extension Services of the former Division of Animal and Crop Production and the Soil Erosion and Weed Control sections of the Division of Soil and Veld Conservation, in one organization, viz. the Division of Soil Conservation and Extension is, therefore, a logical outcome of the developments of the past few years. All these sections assisted farmers in connection with different aspects of general farming, and should now be in a position to co-operate for the promotion of sound farming systems and practices and the conservation of the country's agricultural resources.

It will, of course, be necessary for the Division to gain the confidence and whole-hearted co-operation of the farming community, in order to carry out its functions as outlined in the introductory paragraph.

It has been deemed necessary to organize the Division on a regional basis to enable it to fulfil its functions to the best of its ability and to establish the closest possible contact with the farmers in order to obtain the desired co-operation, the necessity for which will be even greater still when soil conservation districts are proclaimed under the Soil Conservation Act.

With this object in view, the Union was divided into five main regions, each under a Chief Regional Officer assisted by a team of experienced senior officers.

The regional head offices are situated in Stellenbosch, Queenstown, Bloemfontein, Pietermaritzburg and Pretoria and are already in operation.

These regional offices receive assistance from the educational and technical officers stationed in the various districts, who will remain in constant touch with the farmers of their districts and maintain the closest co-operation with the Farmers' Committees which will be

THE AIMS OF THE DIVISION OF SOIL CONSERVATION AND EXTENSION.

appointed in proclaimed conservation districts. These Farmers' Committees will be formed where a group of farmers voluntarily request that their district be proclaimed a conservation district and undertake to apply strictly the farming systems recommended for the district as a whole and for each individual farm.

One of the functions of the Chief Regional Officer will be to study the farming potentialities of his area in order to give guidance in the development of suitable farming systems for sub-divisions of a similar nature.

Although much reclamation work still remains to be done, the emphasis will fall mainly on conservation farming.

Farming systems worked out for districts only will, therefore, not be sufficient but in due course a system will have to be evolved in co-operation with the farmer, for every farm. The plan will have to show the soil erosion reclamation works, dams, silos, etc., to be erected, the division of the farms into camps, the areas most suitable for lands and grazing, respectively, and the grazing systems and cultivation methods to be adopted. It may even be necessary to prescribe radical changes such as the branching over from sheep to cattle farming, the cessation of ploughing on certain lands, etc., in other words, any change which will ensure that there will be no gradual decline in the productivity of the farm concerned, but a steady rise which will be maintained on a permanent basis.

It will be necessary for the chief regional officer and his assistants to devote much time to the new conservation districts proclaimed, and the planning in this connection, but these will not be their only duties. Attention must also be given to farmers falling outside the conservation districts and requiring their services in any phase of their farming problems.

The whole-farm demonstrations which have been in progress for some time now, have proved their worth in giving a clear picture of conservation farming in a specific area.

It is the intention of the Department to extend this service considerably.

Attention will be given to publicity through pamphlets, posters and especially the film and the radio.

By these means information and knowledge will be disseminated.

The Department considers that special attention should be given to the youth of the country in order that the principles of the conservation of agricultural resources may be imprinted on their minds at an early age.

Agricultural club work and land service will therefore be regarded as an important part of the activities of the Division.

The housewife, too, is not overlooked, and the services of the home economics section, are being expanded.

Apart from the services mentioned there are others, such as the control of proclaimed weeds, which will not be neglected.

Melon-fly as a Pest of Granadillas.

F. J. Stofberg, Subtropical Horticultural Research
Station, Nelspruit.

FOR several years past, and particularly since the cultivation of granadillas on an extensive scale in the Transvaal lowveld, considerable losses have been sustained through the activities of some unknown insect agent.

The external appearance of damaged fruits showed an almost typical fungus attack, but internally the activity of some insect was unmistakable.

Large quantities of more or less mature fruits sent in periodically by farmers, and kept in cages in order to rear any insects that might be present in affected fruit, never produced any results. However a close examination of young fruits showed minute sting marks in the rind, which, when opened, revealed the presence of eggs and, in some instances, a few fly maggots.

Further investigation showed that the maggots which hatched from the eggs, did little or no feeding, and for some obscure reason either died or left the fruit within a few days. It is possible that, due to the fruit growing exceptionally fast at this stage, a hard swelling is formed by the skin around the sting, and that this prevents the young maggots from feeding further. This may explain the failure to rear any insects from almost mature fruit, and the phenomenon may be called, for convenience' sake, "abortive stinging."

On the discovery of the maggots, some species of fruit-fly was naturally suspected as the culprit causing the damage to the granadilla fruits. Later, and purely by chance, the writer noticed a melon-fly resting on a young granadilla fruit, with its ovipositor well sunk into the rind and presumably laying eggs. The fly, (apparently *Dacus vertebratus*), was not disturbed, but the fruit was carefully marked for later observation. Two days later the same fruit showed the initial stage of a typical injury. This was substantiated further by inducing similar typical sting marks by caging melon-flies (*Dacus vertebratus* reared from squash) with young granadilla fruits.

According to records obtained from the National Collection of Insects, it appears that the melon-fly (*Dacus bivittatus*) and the fruit-fly (*Ceratitis capitata*) have been reared from granadillas under certain conditions. In addition, it is quite possible that the melon-fly (*Dacus ciliatus*) and the Natal fruit-fly (*Pterandrus rosa*) may also sting and cause similar injury to granadilla fruits.

Appearance of Damaged Fruit.

Fruits are stung when still very young, and the majority of these usually drop within a few days. When older fruits of one-half to three-quarters of an inch in diameter are stung, they show an almost imperceptible pin-prick, and may, after development, either shrivel and drop, or continue to grow till mature, but with the typical injury spot on them.

Figure 1 shows young to mature fruits during various stages of the development of the injury. Within a day or two after being stung, the fruit develops the typical brown spot with the puncture in the centre. In some early stages this mark is quite large and flat, and resembles a thin membrane covering the affected part. Later these spots become dark brown to almost black, and in certain instances a fungus (*Ascochyta* sp.) grows on the affected spot. In

the majority of cases these injuries are pitted, but in some they protrude like warts and are hard.

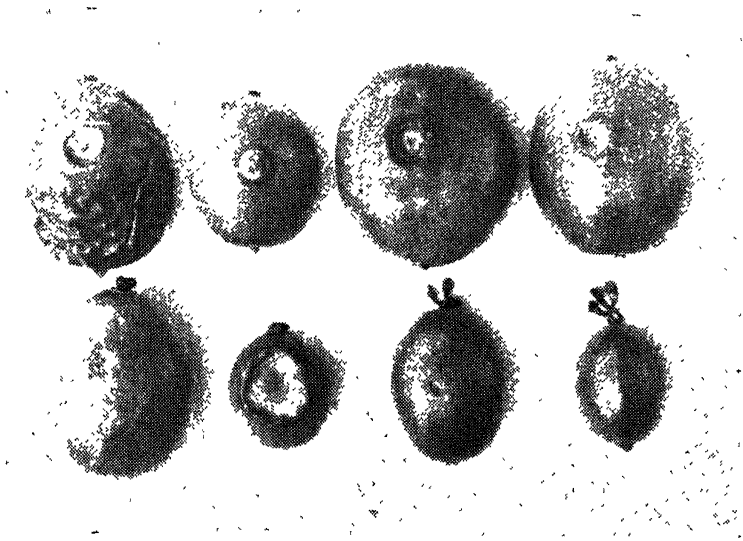


FIG. 1. Granadillas stung by melon-fly.

The internal appearance of stung fruits may vary considerably as is here illustrated in Figure 2.

Normally the sting or puncture does not penetrate the rind, but a hard, cyst-like swelling forms on the inside of the rind, where the

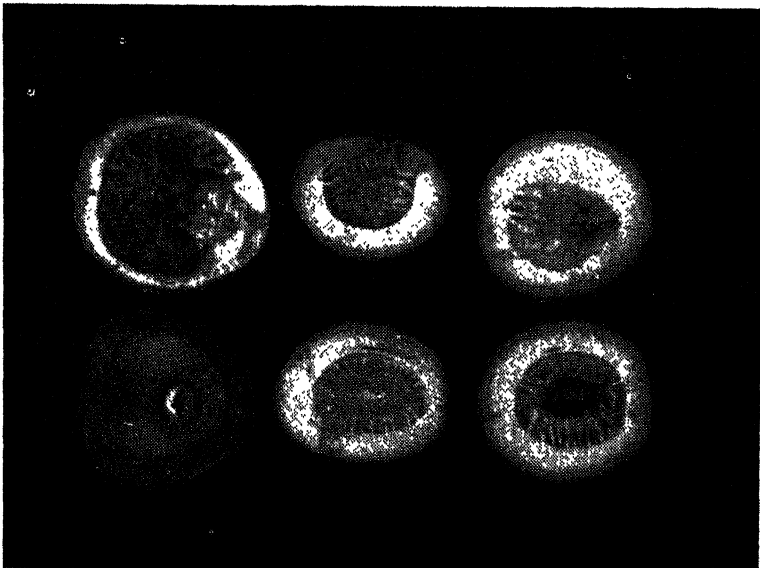


FIG. 2. Stung granadillas cut to show partial arrested development and cyst-like formation inside the fruit.

seeds do not develop. Although the rest of a stung fruit develops in the normal way, it is not well filled and has a bad appearance both externally and internally, which affects its marketing quality. Fortunately, since all stings are abortive, there is no fear of ingesting any maggots with the edible part of an affected fruit.

Control of the Fly Pests.

Although definite information with regard to all species of flies which may cause typical damage is not available at present, the control measure is identical for all common species of melon- and fruit-flies which may be concerned. Combating these pests is simplified by using a single poisoned bait, which is made up from the following ingredients:—

Sodium fluosilicate	1 ounce.
White sugar	2 lb.
Water	4 gallons.

By means of a garden syringe or a white-wash brush this bait is applied or sprinkled in the form of droplets on the foliage of the vines. Apply the bait regularly once a week, and also immediately after every good rain which removes the bait.

Usually the spring crops, and occasionally the late autumn crops, are the most seriously attacked, and one should watch for the first flowers in order to commence with the baiting, which should be continued until all the young fruits are set. Older fruit with hard skins apparently cannot be damaged by flies trying to oviposit.



FIG. 3.—Leaf and fruit spot fungus disease of mature granadillas.

Since melon-flies also severely attack, and breed in great numbers, in squash, cucumber, pumpkin and watermelons, it may reduce the possibilities of attack if granadillas are planted on a site well removed from any of the cucurbits mentioned above.

The symptoms of abortive stinging described above somewhat resemble, and therefore should not be confused with, the lesions caused by a fungus disease (*Macrosporium* sp.), which is commonly

Dryland Lucerne* and Soil Improvement in the Grain Areas of the Winter-Rainfall Area.

Dr. J. H. Hofmeyr, Department of Agronomy, Stellenbosch-
Elsenburg College of Agriculture.

SINCE the introduction of the lucerne subsidy scheme in 1944, grain farmers in the winter-rainfall area have gradually become more lucerne-conscious. Under this scheme, farmers are paid a subsidy of 60 per cent. on the cost of the lucerne seed, and are visited by an officer of the college of agriculture serving the area, who advises them on the establishment of the lucerne. These measures have encouraged many farmers who, in the past, had been hesitant about cultivating lucerne under dryland conditions, to do so, usually with a reasonable degree of success. There is no doubt about the fact that farmers who have successfully established dryland lucerne never wish to be without it again; on the contrary they tend to plant an even larger area to dryland lucerne.

Rôle of Lucerne on Grain Farms.

An area of land under lucerne cannot in itself be regarded as permanent grazing, although it is excellent for grazing and is cultivated almost exclusively for this purpose on dry land. Despite the fact that lucerne is a perennial which can remain alive for many years under favourable conditions, the stand gradually deteriorates when used for grazing, often as a result of overstocking, trampling, cultivation for loosening the soil, etc. Moreover, the stand cannot be replenished by self-propagation, and in the light of these facts it can be regarded only as semi-permanent grazing and is therefore suitable in rotational cropping systems. In addition, lucerne plants have deep roots, and since grain soils in the winter-rainfall area are shallow, it follows that there will be a natural limitation in the expansion of their root systems, with a consequent shortening of the life of the crop.

Hence, if a land has been under lucerne for a number of years, the soil will not only have undergone a valuable period of rest, but at the same time a considerable quantity of organic material in the form of manure and urine from stock as well as plant residues, especially the roots of lucerne and volunteer plants, will have accumulated. But this is not the sole value of lucerne. Being a legume it fixes a large quantity of free nitrogen with the aid of nodule-forming bacteria, making lucerne a protein-rich crop with a high nutritive value. In the course of decomposition a considerable quantity of available nitrogen remains behind for the following crop. If lucerne is cultivated in rotation with winter cereals, the favourable effect is clearly reflected in the increased grain yield. In short, lucerne in a system of rotational cropping on grain farms, ensures not only an increased grain yield, but also considerably better grazing for farm animals, with all the accompanying possibilities, in other words *a better system of mixed farming*.

* For further details in connection with the cultivation of dryland lucerne see article by Dr. J. T. R. Sim, entitled "Dryland Lucerne", *Farming in South Africa*, March, 1943.

Difficulties in Connection with the Establishment of Lucerne.

Considerable difficulty is often experienced in establishing lucerne, for not only are the seeds very small in comparison with those of winter cereals, but the young plants are also very delicate and have special growth requirements. If the farmer knows what factors and influences are detrimental to the establishment of lucerne, he can try to eliminate them. In this connection due attention should be paid to the following:—

Perennial Weeds.—The most important perennial weed which hampers the establishment of lucerne and rapidly ousts it, is couch grass (*Cynodon dactylon*). It does not pay to try to establish lucerne on soil infested with couch (kweek) grass, since lucerne cannot hold its own against this weed. In the Caledon-Bredasdorp area couch-grass infestation is the exception rather than the rule, except on light soils in the Strandveld. But in the Swartland area as well as in the Sandveld, couch grass infestation on arable land is of general occurrence and before lucerne can be sown, special steps must be taken to eradicate the former.

The only effective method of killing couch grass is dry cultivation during the summer months. It is usually necessary to plough once or twice during summer in order to expose the roots; the harrow is also an important weapon in the control of couch grass. As a rule, stubble lands, except those on sandy soils, are too hard to permit of summer ploughing for the control of couch grass. Summer ploughing should therefore be resorted to on lands which have been fallowed and may have received a shallow ploughing or cultivation in September-October.

Another perennial weed which is sometimes troublesome, and which should be eradicated before an attempt is made at establishing lucerne, is sheep sorrel (*Rumex acetosella*). It is useless to try to establish lucerne on soil infested with sheep sorrel and to expect it to grow satisfactorily. As in the case of couch grass, this weed should be eradicated by means of dry cultivation in summer.

Other perennial weeds which often encroach on the land after lucerne has been established, are rhenoster bush, (*Elytropappus rhinocerotis*) and the Savooibos or Klaaslouwbos (*Anathasia spp.*). The difficulty in connection with the control of these bushes is that they grow in the veld and their seeds are easily blown onto the lands. Since lucerne remains on the land for a number of years, there is sufficient time for the weed seed to germinate and to establish itself. Unfortunately, animals do not eat these bushes, and consequently they are left undisturbed to develop and increase.

The rhenoster bush is widely distributed in the winter-rainfall area, while the Klaaslouwbos is found on the more acid soils in mountainous regions. It is not advisable to sow lucerne where these bushes are found, immediately after such an infested land has been ploughed, since a close stand of bushes will develop with the lucerne and oust the latter. Such soil should first be fallowed so that the young plants may be killed by cultivation later on. The following season lucerne is sown with less danger of encroachment.

The fight against encroachment of the above-mentioned bushes on established lucerne lands, must be waged unceasingly by going through the land from time to time and pulling out the young bushes by hand, or by cutting them with a spade. This method is unpractical

and expensive, however, if the infestation is severe or if the bushes are not eradicated soon enough. If the bushes are dense, a mower may be used to good effect, but in this case the bushes must be cut before their stems become too tough and before the seeds have formed. In many cases this will mean that the lucerne can be used over a shorter period; consequently, the system of rotational cropping will have to be adjusted accordingly.

Annual Weeds.—In the winter-rainfall area the growth of this group of weeds is virtually limited to the winter season, since the summers are generally too dry. These annual weeds are the main reason why the sowing of lucerne under dryland conditions during the autumn months cannot be recommended unconditionally. On badly infested lands the weeds often grow so profusely during winter, that the young lucerne is easily ousted, since this crop does not make much growth during the cold winter months. Hence if lucerne is sown during autumn, it is essential to see that the land is reasonably free from the seed of winter weeds.

Many of these winter weeds are useful for grazing purposes, if they grow on old lands. They include gousblom (*Cryptostemma spp.*), crane's bill (*Erodium moschatum*) and burr-clover (*Medicago denticulata*), but since they grow so luxuriantly, they can easily overshadow and oust the young lucerne plants. Ramenas or charlock (*Raphanus raphanistrum*) and wild vetches (*Vicia spp.*) may also be useful for this purpose, although they are the grain farmer's enemies, since it is difficult to separate them from grain seed, and the grade of the seed is subsequently reduced.

An annual weed which is often responsible for the failure of lucerne sown in spring, is the hardy knotgrass (*Polygonum aviculare*). This weed germinates throughout the winter and spring while the soil is damp. It remains alive till late in summer, spread over the ground. This weed is particularly rampant in the Swartland, and to a lesser extent in Caledon and Bredasdorp. Where knotgrass abounds, it is essential to clear the land thoroughly before lucerne is sown. After the soil has been ploughed, it is harrowed two or three times at intervals, or cultivated on the surface to kill all germinating weed plants. The soil must not be cultivated too deep before the seed is sown, as new weed plants will be brought to the surface again, and the previous labour will have been in vain.

The khaki bush (*Inula graveolens*) is a summer weed which germinates during late spring. It is particularly hardy, although it usually grows when the lucerne is in a dormant condition. Thus there is little direct competition between the lucerne and the weed. If the khaki bush abounds, however, it may have a detrimental influence on the lucerne during its first summer season by competing for the available moisture. In such cases the mower may be put to good use just before the weed begins to flower. Since the khaki bush is an annual weed it must germinate and grow from seed every year. If the soil is not ploughed, as in the case of established lucerne, this weed will rapidly diminish after the first year. In any case it would be advisable to destroy the khaki bush during the preceding summer by means of effective cultivation, on lands intended for lucerne.

Soil Acidity and Lime Requirements.

Generally speaking, soils in the winter-rainfall area are fairly acid, and at the same time they suffer from a calcium deficiency. Lucerne needs a large quantity of potash and calcium and although

sufficient quantities of the former are present in soils, the calcium deficiency must be supplemented by the application of lime. Lime not only promotes the growth of lucerne but also enhances its quality and palatability; in other words, it improves the nutritive value of lucerne. In the whole process of soil improvement in the grain area, the application of lime plays an important part.

Before the soil is ploughed and further prepared for the sowing of dryland lucerne, approximately *two* or *three* tons of agricultural lime—ground limestone or calcium carbonate—should be applied per morgen. In the Strandveld of Bredasdorp where the soil is sweet and calcareous, such an application is unnecessary. It must be pointed out that the use of burnt lime and/or slaked lime is not recommended: not only is it less economical, but it is unpleasant to handle, and its immediate effect on the soil is too severe.

Fertilizing and Manuring.

All our soils are deficient in phosphates and this shortage must be supplemented by the application of fertilizer. A nitrogen deficiency is also making itself increasingly felt in the winter-rainfall area but since lucerne is a legume, it has the ability to fix the free nitrogen in a useful form in the soil by means of nodule-forming bacteria. Established lucerne is therefore independent of nitrogen fertilizer, provided nodule-forming bacteria are present in the soil. In the young stage, however, lucerne needs a little nitrogen fertilizer until the plants have become firmly established and the nodule-forming bacteria are able to function. A previous application of stable manure or compost is excellent. If lucerne is sown on soil deficient in nitrogen, or on stubble land, an application of nitrogenous fertilizer is strongly recommended (mixture E or K). At least 200 lb. per morgen of mixture L or superphosphate—if only phosphate is used—is recommended, although 400 lb. per morgen is preferable. During times of fertilizer scarcity farmers were compelled to use even less than 200 lb. per morgen.

Sowing Lucerne.

The method of sowing lucerne can vary according to circumstances, i.e. it can be broadcast by hand, sown with a hand broadcasting machine or with a wheat drill in which case the lucerne seed is mixed with fertilizer and sown through the fertilizer hopper. The main object is to sow the seed at the rate of 20 to 40 lb. per morgen, according to local requirements, evenly over the soil surface. On account of the smallness of lucerne seed, a very important factor in the successful establishment of this crop is shallow sowing. For this purpose the following points should be observed:—

(1) The seed-bed must be cultivated to a fine tilth and levelled before the seed is sown, to ensure uniform covering of the seed. If a wheat drill is used, the pipes must be lifted to scatter the seed over the soil.

(2) Using a light harrow or a light drag with branches tied behind, thinly cover the seed. If a roller is available, it may advantageously be used for covering the seed and where the soil is loose or of a light type, such an implement is essential for ensuring good germination and a satisfactory stand.

If rain falls after sowing but prior to harrowing or rolling, resulting in the prevention of this operation for two or three days, the seed should be left undisturbed, because lucerne seed germinates

very rapidly, and the moist seed-bed immediately initiates this process. Consequently, if the soil is harrowed after roots have been formed, the germinating plants are usually destroyed. Very young lucerne is much more easily damaged by cultivation than grain.

In many cases lucerne has been sown successfully together with winter cereals. This is a cheap method of establishing the crop but cannot be recommended unreservedly. The assumption that winter grain protects the young lucerne and in this way serves as a protective crop, is not quite correct under the conditions obtaining in the Western Cape Province. In this area, winter temperatures are never very low, and young lucerne does not need this protection. On the contrary, the young plants are often overshadowed and, in addition, have to compete for the available plant nutrients. There is a certain amount of competition for moisture during late spring when the rains cease, and the frail lucerne plants often suffer fatal results. As may be expected, areas which receive little or no late spring and early summer rains, are less suitable for the establishment of lucerne in this manner. Consequently, the sowing of lucerne together with winter cereals is not recommended in the Koeberg-Swartland-Sandveld area. In the Caledon-Bredasdorp area, however, it is a fairly general practice, and near the coast in the Strandveld area, this method of sowing has been applied with great success. The late rains help the lucerne to become well established after the grain has been harvested, and before the summer drought sets in. In addition to this, the summers are cooler and moisture conditions are more favourable there than in the Swartland area. In the Rûens area, however, it is often found that it is safer to sow lucerne alone than with grain.

Rotational cropping in the winter-rainfall area with winter cereals and lucerne, has already been discussed in a previous issue* of *Farming in South Africa*. Two systems, in particular, are emphasized:—

(1) One of twelve years for the drier parts of the winter-rainfall area (Koeberg-Swartland), namely *lucerne, lucerne, lucerne, fallow, wheat, (or oats), fallow, wheat, fallow, wheat, (or oats), fallow*; and

(2) one of eight years or a more intensive system for areas with a higher rainfall, namely *lucerne, lucerne, lucerne, lucerne, wheat, wheat, oats, fallow*. The possibilities are not exhausted with these two systems, since they may be altered according to particular farming conditions, and additional crops such as subterranean clover, which may be sown with lucerne, can play an important rôle.

The change-over to a new rotational cropping system in which improved grazing will necessarily play an important part, should be gradual in view of the extra costs involved in making new camps, re-arranging existing camps and increasing the number of stock on the farm, etc. If the change-over is carried out gradually and judiciously, however, a new system may be adopted, even without sacrificing too much arable land during any given year. In time to come the increased yield from winter grain which follows lucerne, will more than compensate for the smaller surface put under grain. The assertion that this system is not suitable for *small* winter-grain farms, is completely unfounded, since the elimination of the old-land period in the existing monoculture system of grain-production which is in force there, in order to increase the acreage under grain, undeniably causes the soil to deteriorate. The cultivation of lucerne

* Dr. J. T. R. Sim: Crop Rotation in the Grain Districts of the Winter-rainfall Area—*Farming in South Africa*, March, 1943.

will in time to come, help to regain and maintain soil fertility and push up production to above the existing level; and here improved grazing and the elimination of expensive nitrogenous fertilizers are not taken into account. It can justly be said that the solution of the problems of the small farmer lies in dryland lucerne culture as part of his cropping system.

Long-term Possibilities.

It is often difficult to commence the cultivation of dryland lucerne and then to include it in a system of rotational cropping, but once a start has been made, numerous possibilities are created for future development.

Lucerne is an excellent grazing crop and under dryland conditions in the winter-rainfall area seldom causes bloating in stock. Lucerne grazing may also be supplemented by sowing subterranean clover (*Trifolium subterraneum*) together with lucerne or on established lucerne, depending on the season of the year in which the lucerne is sown. Subterranean clover* should be sown as soon as possible after the first autumn rains. The seed is expensive but on the contrary it can be sown at the rate of as little as 3 to 5 lb. per morgen. Since subterranean clover is an annual and conceals its seeds well, the stand increases every year, even under normal grazing conditions. One of the advantages of subterranean clover is that it provides abundant grazing in the middle of winter when the growth of lucerne is practically at a standstill, and so increases the carrying capacity of the land. In addition, it is a legume which provides the soil with nitrogen and assists in the improvement of soil fertility. This promotes the growth of a better protective cover for the soil, and counteracts erosion.

In the Caledon-Bredasdorp area subterranean clover is used to a considerable extent in this manner, and its possibilities in that area seem to be unlimited. This use of subterranean clover has not been sufficiently tested out in the Koeberg-Swartland-Sandveld area yet, but nevertheless, there seem to be possibilities in this direction.

If lucerne is cultivated alone or with subterranean clover, the ordinary volunteer plants like gousblom, crane's bill, various annual grasses, etc., increase rapidly. A better soil covering brings numerous benefits, such as more grazing, but in particular better protection of the soil against erosion. It is, consequently, quite probable that in the process of soil improvement further use may be made of certain desirable permanent grasses. Naturally, they will have to be grasses which grow in winter and undergo a period of rest in summer. In this respect *Phalaris tuberosa** seems to be a probable choice. Such a permanent grass will bind the soil and prevent it from being washed away, and will ensure excellent mixed grazing with lucerne and subterranean clover. The ideal pasture is a mixture of legumes (particularly clovers) and various types of grass.

The chances for development seem to be best in the Caledon-Bredasdorp area since there is no doubt that this area had a permanent grass covering years ago. In the Rûens there are at present large areas under grain which should never have been cultivated, owing to the excessive steepness of some of the slopes and the resulting danger of erosion. In such cases permanent mechanical control of

* Dr. P. W. Vorster: Established grasses and clovers for the winter-rainfall area—*Farming in South Africa*, March, 1943.

Summer Crops Under Irrigation for Grazing and Hay Production.

J. S. Starke*, Department of Animal Husbandry, Agricultural Research Institute, University of Pretoria.

IT has been felt for some time that the introduction of livestock into the present intensive types of farming practised under irrigation would probably promote a more diversified, better balanced and stabilized farming system. What form the animal factor should take, would depend on the type of animal which could utilize to the fullest extent the crops of irrigation farming. Under any irrigation scheme with a plentiful supply of water the production of green forage crops is possible throughout the year. The animal which can make most efficient use of an abundance of green pasturage, is the lactating ruminant. There are two such types of ruminants which can play an important rôle in intensive farming, viz. dairy cows producing whole-milk for human consumption, and, secondly, ewes for suckler-lamb production, in which the milk of the lactating ewe is converted into high quality meat for human consumption.



FIG. 1.—Cutting sunn-hemp hay for the second time 63 days after the first cutting. (Note hat held by man standing in land).

At the Losperfontein Experiment Station, under the Hartebeestpoort Irrigation Scheme, it was decided to adopt suckler-lamb production as the animal factor in the experiments in connection with irrigation farming. For this purpose various crops were grown to determine which would be the most suitable for grazing as well as for hay production. Although sheep were used to graze the crops, the results obtained may also be applicable to dairy farming under irrigation.

The results with the winter crops have been discussed in *Farming in South Africa* (Starke, 1946). In the present article a

* Formerly Officer-in-Charge, Losperfontein Experiment Station.

review is given of the grazing capacity and hay production of the numerous summer crops grown during the four years 1938-1942.

The crops were not grown and grazed in any controlled experiments but were incidental to the various sheep experiments conducted at Losperfontein. However, as a certain routine and standard methods were followed in production and grazing, a comparison between the various crops was made possible with regard to their capacity for grazing and hay production. The fact that most of the crops were grown on field scale and utilized as in normal farming practice, enhanced the comparative value of the results from a practical point of view.

It is hoped that the experience gained with these crops will be of some value and guidance, particularly to those engaged in similar production experiments.

Crops Grown.

The crops grown to provide the sheep with grazing throughout the year were mostly annuals. A certain amount of lucerne was grown, largely for hay production, but was used on a few occasions for grazing as well. It was unfortunately not possible to make any comparisons between the grazing capacity of lucerne and that of the annual summer crops.

The planting of the summer crops commenced in mid-August and extended until the middle of December. Early planting was necessary to ensure feed for the stock during early summer, as the winter cereals deteriorated rapidly from October onwards.

The lands were prepared in the normal way, as previously described (Starke—1946). All the crops received an application of superphosphate at the rate of 200 lb. per morgen. In addition, the cereal crops, such as Sudan grass, received a top-dressing of 100 lb. sulphate of ammonia per morgen during the 1939-40 and 1940-41 seasons.

The annual crops planted included the summer cereals Sudan grass and babala and the following legumes: cowpeas (upright and procumbent types), soya beans, velvet beans and sunn hemp. The upright cowpeas and soya beans were of the varieties developed at the Potchefstroom College of Agriculture.

The following rates of seeding were found to be satisfactory at Losperfontein:—

	<i>lb. per morgen.</i>
Cowpeas, procumbent (Iron)	35-40
Cowpeas, upright (34.C.361)	35
Soya beans (34.S.256)	40
Sunn hemp (Somerset)	50
Velvet beans (Somerset)	80-90
Sudan grass	45
Babala	40-50

The Sudan-grass, babala and sunn hemp were either broadcast by hand or drilled in. The cowpeas, soya beans and velvet beans were planted in rows, 2 ft. 6 in. apart, by means of a mealie planter with suitably adjusted plates.* For the soya beans and Iron cowpeas a plate with 20 holes of $\frac{3}{8}$ in. diameter was used; for the smaller seed of the upright cowpea 20 holes of $\frac{5}{16}$ in. diameter gave good results; and for the large velvet bean seeds 9-12 holes of $\frac{11}{16}$ in. diameter were found to be adequate.

Considerable difficulty was at first experienced in obtaining a good stand of soya beans, but the germination was appreciably

* For more information with regard to the production of these legumes, the reader is referred to the articles by Saunders and du Toit (see references).

SUMMER CROPS FOR GRAZING AND HAY PRODUCTION.

improved by shallow planting. No trouble was experienced with the germination of the other crops.

Grazing Capacity.

The grazing of the summer crops usually commenced early in November, and lasted until May. As the crops were grazed by sheep, the yield or grazing capacity was expressed in terms of sheep-days. One sheep-day represented the grazing of one mature sheep, average weight 100 lb., for the full twenty-four hours. Although this method of expressing grazing capacity has its limitations, it was considered to be satisfactory under the conditions at Losperfontein, as the sheep lived on the lands and maintained their body weight on a relatively constant level throughout the season. The number of sheep-days can be considered equivalent to an equal number of pounds Starch Equivalent (S.E.), since the daily maintenance requirement of a 100-lb. sheep (i.e. one sheep-day) is approximately 1.0 lb. S.E.

The results recorded in Table I represent the averages of all the lands sown with the various crops used solely for grazing. The number of paddocks and the area sown are indicated in columns 2 and 3.

TABLE I.—*Total grazing capacity.*

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crop.	Number of camps.	Area (morgen).	Growth period before first grazing (days).	Times grazed.	Cropping period (days).	Sheep-days per morgen. = lb. S.E.
Cowpeas (Iron)....	28	49.5	123	1	148	1,414
Cowpeas (upright)..	8	12.2	118	1	135	1,323
Soya beans.....	4	7.4	99	1	109	1,151
Velvet beans.....	7	14.0	132	1	151	1,233
Sunn hemp.....	7	14.5	58	1.6	96	1,088
Sudan grass.....	17	36.7	70	3.8	177	2,303
Babala.....	1	2.2	72	4	220	2,779

It will be seen in column 4 that sunn hemp had the shortest period of growth before it was grazed, viz. less than two months after planting. The sunn hemp grew extremely rapidly and luxuriantly, as can be seen in Fig. 1, and was about to flower when grazed. Sudan grass and babala were grazed for the first time about 70 days after planting, babala being a little slower than Sudan grass.

These crops with short growing periods were planted early in the season, viz. mid-August to September, to ensure the necessary feed at the change-over from winter to summer grazing in November. Such early planting of the harder summer crops was possible, as the danger of severe frost at Losperfontein was negligible after the middle of August (for Temperatures see Table VI).

The other legumes mentioned in Table I were planted after the danger of frost was over, viz., during the latter part of September and at intervals until about the middle of December. The cowpeas and soya beans were grazed for the first time 3-4 months after planting, and the velvet beans fully another month later. The two types of cowpeas could have been grazed considerably earlier than indicated by the average growth period in Table I, but owing to their relatively more indeterminate growth the commencement of grazing was often somewhat delayed.

As the velvet bean is very susceptible to frost, it was found undesirable to delay its grazing too long in the early autumn, with the result that at times full use could not be made of the crop, because of its long growing season.

The cowpeas, soya beans and velvet beans were grazed only once, whilst Sudan grass, babala and sunn hemp were grazed several times. The lands sown to the crops grazed only once were not grazed as a whole but in sections fenced off by means of portable hurdles, in order to reduce trampling. Hurdles were unnecessary in the case of Sudan grass, babala and sunn hemp; in these cases the two-morgen camps were grazed as a whole by flocks of about 200 sheep.

The cropping period recorded in column 6 indicates the time the crop was on the land, i.e. from planting till the completion of grazing. This must be taken into consideration when comparing the total grazing capacities given in column 7.

It will be seen that the graminaceous crops yielded the most grazing; this can be ascribed to the greater number of times that they were grazed, as well as to the longer period that they were on the land.

Of the legumes, Iron cowpeas yielded the most grazing but had a somewhat longer cropping period than the upright cowpea or soya bean, due chiefly to its more indeterminate growth. Soya beans gave the lowest grazing return of the three but also had the shortest cropping period. If the time factor is taken into consideration, it will not be possible to discriminate quite so much between the grazing capacities of soya beans and the two types of cowpeas.

Although the velvet bean had a longer cropping period than the other legumes, it did not produce a higher grazing return; in fact, its productivity was even lower than that of both types of cowpeas. Generally it appears as if this crop provides an enormous amount of feed, but a closer study of its growth shows that the velvet bean, grown by itself, has a solid umbrella of leafy material, underneath which the leaves die off. When sheep graze the crop, they soon destroy this outer dome of leafy growth with the result that the



FIG. 2.—A good stand of upright cowpeas being mown 84 days after planting. (Estimated yield three tons hay per morgen).

SUMMER CROPS FOR GRAZING AND HAY PRODUCTION.

amount of grazing obtained is considerably less than expected (see figures 4 and 5). Subsequently it has been found that the velvet bean gives better results as a grazing crop, when grown with some strong, upright growing crop, such as mealies, for support.

Sunn hemp has been used mainly as a green-manuring crop in the past, but at Losperfontein it was used with success as a grazing crop for sheep. It grew rapidly and was found to be capable of yielding more than one grazing. The grazing capacity of sunn hemp was low, viz. 1,088 sheep-days per morgen, but the cropping period was only 96 days for the 1.6 times it was grazed on the average. In a few instances sunn hemp was grazed up to three times with the results indicated in Table II.

TABLE II.—*Results of individual grazings.*

Grazing.	Sunn Hemp.			Sudan Grass.			Babala.		
	Morgen.	Growth period (days).	Sheep-days per morgen.	Morgen.	Growth period (days).	Sheep-days per morgen.	Morgen.	Growth period (days).	Sheep-days per morgen.
First.....	14.5	58	744	41.6	70	687	2.2	72	704
Second.....	3.5	39	632	40.4	29	704	2.2	37	662
Third.....	2.7	45	587	34.4	24	667	2.2	36	896
Average.....	—	47	654	—	41	686	—	48	754
Fourth.....	—	—	—	28.0	27	507	2.2	37	517
Fifth.....	—	—	—	7.7	22	277	—	—	—

The differences, recorded in Table II, between the areas grazed the first, second or third time are due to the fact that it was not possible to graze all the lands an equal number of times.

Sunn hemp had a slightly lower grazing capacity than babala or Sudan grass. Babala had the highest productivity, viz. an average of 754 sheep-days per morgen for each of the first three grazings, compared with 686 and 654 sheep-days for Sudan grass and sunn hemp, respectively. Sunn hemp, however, had the shortest growth period before the first grazing, but required a longer period for recovery. Sudan grass had a shorter growth period than babala; this was more marked after the first grazing.

Mowing of the coarse stalks left after grazing was desirable, particularly in the case of sunn hemp, to obtain a better second growth.

It was found that cowpeas, particularly the upright type, were also capable of making new growth after mowing. Three paddocks (4.7 morgen) made such a satisfactory regrowth after the removal of a hay crop, that, when grazed 65 days after cutting, an average of 538 sheep-days' grazing per morgen was obtained from the aftermath. Such aftermath grazing can be a most valuable source of supplementary feed for lambing ewes during late summer and early autumn under dry-land conditions as well.

Composition of Pasturage.

The sheep readily ate all the crops under discussion. Sudan grass when young was relished by the sheep; likewise babala. If, however, babala is allowed to become too coarse, the stalks are not,

eaten by sheep. Babala would be more suitable as a grazing crop for cattle.

Sheep grazed soya beans readily, but preferred cowpeas. (In one cowpea pasture there happened to be a few mung beans but these were not at all palatable, and they were left to the last.) The sheep ate the stalks of the procumbent cowpea but left the more woody portions of the upright cowpea stalks. A few samples of some of the pasturage, taken just before grazing commenced, were separated into leaf and stalk; their proportions in percentage of green weight were as follows:—

Percentage Proportion of Leaf to Stalk.

Cowpeas (Iron)	64:36
Soya beans	52:48
Velvet beans	49:51
Sunn hemp	53:47

It will be seen that the procumbent cowpea had the highest proportion of leaf to stalk, viz. 64 per cent.: 36 per cent. Unfortunately the upright cowpea was not similarly separated; however, from observations it would appear that it had a larger proportion of stalk than the procumbent type.

In the soya bean and sunn hemp pastures the leaf made up just over half of the total green material. The stalks, however, were not eaten by the sheep owing to their woodiness. Although the sunn-hemp plants were well over 5 feet in height on the average, the sheep, by bending the stems, had no difficulty in grazing the plants right to the tips; they stripped the plant of its leaves, leaving the more woody portion of the stalk.

Both sunn-hemp hay and pasturage were readily eaten by the sheep, which did not appear to suffer from any ill effects. Investigations in Rhodesia have also shown that sunn hemp hay is not poisonous to cattle and pigs (Sharp, 1938; Romyn and Fitt, 1938; Lawrence, 1941). However, it would appear that horses suffer from a slow poisoning when fed sunn-hemp hay; furthermore, it is recommended that it should not be the sole diet of cattle and sheep for any length of time (Steyn, 1946).

Of the leguminous pastures, velvet beans had the lowest proportion of leaf to stalk, viz. 49:51, probably due to their long vines. The wastage in grazing velvet beans was considerable; when injured, the leaves and stalks had a tendency to turn black and were then not readily eaten by sheep. The long vines also frequently entangled the sheep; hence it would not be advisable to graze velvet beans with ewes heavy in lamb or ewes with young lambs.

Representative samples of the pasturage were taken for chemical analysis before grazing commenced at approximately the flowering stage of growth. A complete chemical analysis of the summer crops grazed during 1940 and 1941 was done by the Division of Chemical Services, whilst in 1942 only the protein and P₂O₅ contents of the pasturage were determined. The results are summarized in Table III.

The protein content of the graminaceous pasturage was approximately 10 per cent., whilst that of the various leguminous pastures varied between 14 per cent. and 20 per cent. Of the legumes, sunn hemp was the highest in protein (20.76 per cent.), whilst the soya bean was the lowest (14.38 per cent.). The lower protein content of the upright cowpea in comparison with that of the procumbent type (Iron) is probably due to a larger proportion of stalk in relation to leaf.

Sudan grass had the highest fibre content, viz. 32.01 per cent. The velvet-bean pasturage also had a high fibre content, which is in

SUMMER CROPS FOR GRAZING AND HAY PRODUCTION.

TABLE III.—*Average composition of summer crops when grazed (on dry matter basis).*

Crop.	Number of analyses.*	Per cent. protein.	Per cent. fibre.	Per cent. CaO.	Per cent. P ₂ O ₅ .
Cowpeas (Iron).....	21 (15)	17.85	25.83	3.01	0.59
Cowpeas (upright)...	8 (3)	16.61	27.45	3.86	0.50
Soya beans.....	4 (3)	14.38	25.60	2.82	0.66
Velvet beans.....	5 (1)	18.10	31.14	2.75	0.51
Sunn hemp.....	10	20.76	—	—	0.52
Sudan grass.....	56 (36)	9.68	32.01	0.69	0.56
Babala.....	4	10.48	—	—	0.87

* Numbers in brackets indicate the number of analyses made for fibre and CaO content.

agreement with its high proportion of stalk; however, this figure, from one analysis, should be regarded with some reserve. The upright cowpea had a higher fibre content than the procumbent, probably due to a greater proportion of stalk to leaf.

The leguminous pastures all showed a high lime content, viz. approximately 3 per cent. CaO, whilst that of Sudan grass was only 0.69 per cent.

Sudan grass was similar to the leguminous pastures in phosphate content; babala, however, was higher than the other pastures, viz. 0.87 per cent. P₂O₅. Of the legumes, the soya bean had the highest



FIG. 3.—An excellent stand of soya beans being cut 96 days after planting.
(Estimated yield four tons hay per morgen.)

P₂O₅ percentage. The procumbent type of cowpea also had a higher phosphatic content than its upright relation. It would thus appear that in general the procumbent cowpea is slightly superior to the upright variety in feeding value.

Hay Production.

A fairly large area of the summer crops was mown for hay. The accompanying illustrations indicate the stand and stage of growth of the various crops when mowed.

In haymaking it is desirable to collect the swath into cocks as soon as possible, because the longer hay is allowed to lie exposed to sun, rain, etc., the greater will be the loss in feeding value. Once the hay is cocked, damage by rain, etc., is not so great.

Under the climatic conditions at Losperfontein, where the rainfall and humidity were relatively low, the swath was raked into windrows within 1-2 days after cutting; after another day or two the hay was cocked. The subsequent interval before the hay was carted for stacking, varied considerably, depending on the type of crop and weather conditions.

Handling of the leguminous hays was done only in the early morning, and preferably never later than 10 o'clock on sunny days, to prevent loss of leaf.

Of the leguminous crops, lucerne was the least difficult to cure in the field and to handle in haymaking; soya beans and sunn hemp were less difficult than cowpeas and velvet beans. Usually lucerne hay was carted off the land on the third day after mowing. Soya-bean hay did not remain on the land much longer but the curing of cowpea hay was a lengthier process, usually taking about a week in fine weather. The upright cowpea was considerably easier to handle in haymaking than the procumbent variety. The velvet bean was most difficult to handle because of its vining habit.

The hay yields were estimated from the number of wagonloads by weighing the hay from a normal load off each type of wagon. Probably the estimated yields given in Table IV are somewhat conservative.

Unfortunately it was not possible to include lucerne in the comparison for hay production. This is a regrettable omission, since lucerne is regarded as the most important hay crop under irrigation, and it would have been of value to know how the annual hay crops compared with lucerne.

TABLE IV.—*Hay production.*

Crop.	Morgen.	Growth period (days).	Tons hay per cutting per morgen.	Residual grazing. Sheep-days per morgen.	Total she p-days =lb. S.E.
Cowpeas (Iron).....	26.0	104	3.1	485	2,686
Cowpeas (upright)...	20.0	98	3.0	323	2,453
Soya beans.....	17.9	111	3.1	289	2,490
Sunn hemp.....	11.0	61	2.0	237	1,657
Sudan grass.....	5.7	36*	1.5	—	—

* Hay was cut only after a first grazing.

As far as possible the crops were cut at the correct stage for hay-making as recommended by Saunders and du Toit; e.g. upright cowpeas should be cut when the first pods begin to ripen; soya beans when the pods are firmly set and the lower leaves commence to turn yellow; and sunn hemp whilst still in the bud stage.

The average growth periods recorded in Table IV for cowpeas (procumbent and upright types) and soya beans are possibly longer than they normally would be, because in some instances the cutting of these crops was purposely delayed until it was assured that sufficient other grazing was available for the sheep. At times these crops were cut as early as 90 days after planting (see illustrations).

Cowpeas and soya beans yielded only one cutting of hay, viz. approximately 3 tons per morgen. This was higher than that obtained from the first cutting of sunn hemp (2 tons per morgen). The latter, however, had a considerably shorter growth period and was also



FIG. 4.—A mass of velvet beans about to be grazed, 167 days after planting.

capable of yielding more than one cutting (see figure 1). Three morgen (2 paddocks) of sunn hemp, cut twice, gave a total of 4:4 tons hay in 124 days after planting, plus a residual grazing of 272 sheep-days per morgen. If total yields per season are considered, sunn hemp will outyield the other legumes. It will, however, be noted in



FIG. 5.—Velvet beans being grazed by sheep. Note that the dome of leafy growth has been destroyed.

Table VII that sunn hemp received more water than the other crops cut for hay; this factor may be partially responsible for the greater yield of the sunn hemp.

After the removal of the hay crop, a considerable amount of residual grazing was obtained. The procumbent cowpea provided the most residual grazing, owing to its runner growth, which was not cut so cleanly by the mower.



FIG. 6.—An excellent stand of upright cowpeas ready for grazing.

The total number of sheep-days (or lb. S.E.) from hay and after-math grazing is given in the last column in Table IV. The hay yield has been converted to sheep-days on the basis that 1 ton of hay is equivalent to 710 sheep-days. This arbitrary determination is based on the consumption of 2.8 lb. hay per day by a 100-lb. sheep for its body's requirements.

Representative samples of the chaffed hays, when fed to sheep in dry lot, were taken for chemical analysis. The average compositions of the annual hay crops are compared in Table V with the composition of lucerne also cut at Losperfontein.

TABLE V.—Composition of hays (on dry matter basis).

Hay.	Number of analyses.	Per cent. protein.	Per cent. crude fibre.	Per cent. CaO.	Per cent. P_2O_5 .
Lucerne.....	4	18.47	31.73	2.28	0.44
Cowpeas.....	4	13.97	37.89	2.22	0.52
Soya beans.....	3	11.33	33.72	2.42	0.53
Sunn hemp.....	2 (1)	16.72	28.87	2.14	0.53
Sudan grass.....	1	9.29	35.22	0.96	0.64

(1) Only one analysis for crude fibre and CaO.

None of the annual legume hays had a protein content as high as that of lucerne. Sunn hemp was the second highest with a protein percentage of 16.7. The soya bean had the lowest protein content of all the legumes. The hays in general had a somewhat lower protein content than the pastures when grazed. (See Table III.)

The fibre content of the cowpea and soya-bean hays was higher than that of the lucerne hay. The fibre content of the sunn-hemp

SUMMER CROPS FOR GRAZING AND HAY PRODUCTION.

hay was lower than that of the other leguminous hays, but too much value cannot be attached to this figure as it represents only one analysis.

The legumes were again considerably higher in lime than Sudan grass; also, the difference in P_2O_5 content between legumes and Sudan grass was again of minor significance, as in the case of the pastures when grazed.

In general the average composition of the hays and pasturages is in agreement with the analyses given by Morrison (1936), although the protein content is somewhat lower and the fibre content higher than in the American figures.

Water Utilization.

Although Losperfontein is situated in the summer-rainfall area with an average annual rainfall of 23 in., it was at times found desirable to irrigate the summer crops. Irrigation was essential, particularly in the case of early-planted crops, to ensure that fodder production by the summer crops would link up with that of the winter crops. Further, the irrigation of the ground at sowing was found to be desirable throughout the summer, as with the need for a regular supply of fodder too much reliance could not be placed on the rainfall for germination of the crops.

The average rainfall recorded at Losperfontein during 1926-1944 is indicated in Table VI. The temperatures were recorded during 1939-1945 in a Stephenson screen at the Hartbeestpoort Experiment Station, some five miles distant from Losperfontein.

TABLE VI. *Rainfall and temperature.*

	Rainfall.	Rainy days.	Average daily maximum.	Seasonal maximum.	Average daily minimum.	Seasonal minimum.
Summer (October-March).	19.80	44	81.9	97.7	59.6	45.6
Winter (April-September).	3.49	10	74.6	87.7	40.8	22.5
Annual.....	23.38	54	79.8		50.2	

The total number of morgen of the various crops irrigated and the average amount of water used during the three summer seasons 1939-40, 1940-41 and 1941-42 are indicated in Table VII. Most of the crops were irrigated at the time of planting, after which they were only irrigated whenever it was deemed necessary. The number of hours of a $\frac{1}{2}$ cusec. stream required to irrigate each land was recorded. The total amount of irrigation was then converted to inches (column 7) on the basis that 1 hour of a $\frac{1}{2}$ cusec. stream per morgen is equivalent to 0.35 inches. In addition, the total rainfall received by each land during its cropping period was calculated and the average for each crop recorded in column 6. The total amount of water received by each crop thus consisted of water received by irrigation plus rainfall received during that period.

The utilization of water by the crops used for grazing and hay production is given in terms of sheep-days per morgen per inch total water (column) and per inch applied water (column 11). In the arbitrary determination of the grazing capacity of the crops cut for hay (column 9) it was assumed that 1 ton of hay was equivalent to 710 sheep-days.

TABLE VII.—*Irrigation of summer crops.*

(1) Crop.	(2) Morgen.	(3) Cropping period (days).	(4) Number of irrigations.	(5) Interval between irrigations (days).	(6) Rainfall received (inches).	(7) Irrigation received (inches).	(8) Total water (inches).	(9) Sheep-days per morgen.	(10) Sheep-days per morgen/ inch water.	(11) Sheep-days per morgen/ inch applied water.
<i>(a) Cut for Hay—</i>										
Cowpeas (upright)	20.0	121	2.8	49.9	12.75	14.26	27.01	2,274	88.2	176.7
Soya beans.....	17.9	111	2.9	50.4	10.80	15.50	26.30	2,185	89.3	168.3
Sunn hemp.....	8.0	139	4.2	28.2	17.05	20.63	37.68	2,659	71.3	134.3
Sudan grass.....	5.7	173	4.0	29.0	15.64	13.72	29.36	3,188	107.5	236.9
<i>(b) Grazed—</i>										
Cowpea (Iron)....	38.5	140	3.0	44.0	14.23	19.43	33.66	1,250	39.7	78.6
Cowpeas (upright)	12.2	135	3.1	45.0	14.95	16.87	31.82	1,368	44.1	80.9
Soya beans.....	7.4	109	2.2	47.3	10.20	11.42	21.62	1,145	60.5	127.4
Velvet beans.....	14.0	169	4.0	35.1	18.73	17.98	36.71	1,433	42.5	93.4
Sunn hemp.....	9.8	104	2.8	23.0	12.86	13.65	26.51	1,098	46.9	79.8
Sudan grass.....	35.1	178	3.4	38.5	15.83	18.14	33.97	2,259	68.4	142.1
Average crops grazed.....	209.2	178	6.2	29.9	6.71	25.37	32.08	2,369	77.8	93.4

SUMMER CROPS FOR GRAZING AND HAY PRODUCTION.

The summer crops were irrigated, on the average, about three times with an interval of roughly 4 to 7 weeks between irrigations. The winter crops, the average figures for which are also given in Table VII, were irrigated more than six times at intervals of 30 days on the average (Starke, 1946). Although the winter crops were irrigated twice as often as the summer crops, they received only about one and a half times the amount of irrigation water (column 7). The summer crops, as can be expected, were favoured with more than double the rainfall received by the winter crops. They received about the same total amount of water as the winter crops, viz. 32 inches, although their average cropping periods were considerably shorter in most cases.

Whether cut for hay or grazed, the summer crops received about the same amount of water, but there was a considerable difference in the yield expressed in sheep days per morgen. As a result the hay crops showed a better utilization of water than those grazed. This can be ascribed partly to a greater wastage of feed, when the paddocks are grazed, and to the somewhat disturbing effect which the grazing animal may have on the plant, although the assumption that 1 ton of hay is equivalent to 710 sheep-days may be a source of error.

A comparison of the winter and summer crops, used only for grazing, shows that the grazing capacity of the summer crops was not as high as that of the winter crops, largely because of a shorter cropping period. Both, however, received similar quantities of water (irrigation and rainfall). Consequently the utilization of water by the summer crops was not as good as that of the winter crops. The greater amount of water used by the summer crops can be attributed to the high temperatures prevailing (see Table VI) and to the lack of control of the rainfall. When considering the productivity per inch, during the summer months, of applied water, it will be seen that the summer crops, except for some of the legumes grazed, showed a better utilization of irrigation water.

A detailed study of the data for the various summer crops in Table VII will reveal that although Sudan grass had a considerably longer cropping period than the other crops, it did not receive much more water. The grazing capacity of Sudan grass was by far the highest, with the result that it showed a considerably better utilization of water than the legumes. The difference between Sudan grass and the legumes in respect of water utilization is more marked in the paddocks grazed than in those cut for hay.

From the observations on grazing capacity of, and water utilization by, the various summer crops, it can be inferred that for grazing purposes a graminaceous crop would give the best results, whilst legumes should be used for making hay. However, soil fertility is an important factor, which should not be overlooked.

Residual Effect.

The effect of some of the summer crops on the productivity of the ensuing winter crop is illustrated in Table VIII.

The grazing capacity of the oats has been corrected to an arbitrary cropping period of 180 days in Table VIII to facilitate comparison between the residual effects of the various summer crops.

During 1939, the first season of these experiments, there was an enormous difference between the grazing capacity of oats sown after cowpeas compared with that sown after Sudan grass; the fertilizer

treatment was similar in all cases, viz. 200 lb. supers per morgen. The protein content of the oats after Sudan grass was also very much lower, due largely to the longer growth period required before the

TABLE VIII.—*Grazing capacity of oats after various summer crops.*

Year.	Summer crop preceding oats.	Morgen.	Cropping period (days)	Sheep-days per morgen.	Sheep-days per morgen—180 days.	Per cent. protein.	Per cent P_2O_5 .
1939...	Cowpeas.....	6.6	158	2,419	2,756	13.66	0.624
	Sudan grass + Babala	9.0	186	1,347	1,304	9.92	0.530
1940.. {	Cowpeas.....	27.4	148	1,985	2,414	14.13	0.561
1941.. {	Sudan grass.....	24.9	164	1,841	2,021	13.20	0.577

oats could be grazed. The oat crop following Sudan grass was noticeably inferior in growth and colour to the general growth made by oats. The difference becomes more significant when it is realized that the Sudan grass and babala previous to the oats had been grazed twice and then cut for hay, whilst the cowpeas were mostly cut for hay and only the aftermath grazed.

In 1940 and 1941 Sudan grass was sown on lands which had had a leguminous crop the previous summer; furthermore, it was grazed and not cut for hay except in isolated instances and then the winter crop following Sudan grass received 100 lb. sulphate of ammonia per morgen with the second irrigation in addition to the phosphatic fertilizer given to all the winter crops. There was a marked improvement in the growth of the oats compared with the crop after Sudan grass in 1939, with the result that both the grazing capacity and the protein content of the oats were increased. This improvement can be ascribed to the nitrogenous fertilizer, as well as to the residual effect of the cowpea crop previous to the Sudan grass, and to the fact that the Sudan grass was grazed and not cut for hay.

Recommendations.

It has been shown that crops capable of being grazed several times furnished the greatest quantity of grazing over the whole season, e.g. Sudan grass, babala and sunn hemp. However, the graminaceous crops had a lower feeding value than legumes and also had a deleterious effect on the ensuing crop. In an attempt to combine the desirable qualities of both types of crops, mixtures of sunn hemp and Sudan grass or babala were tried out at Losperfontein with results as indicated in Table IX.

The initial results are promising. The two crops grew well together and were ready for grazing or mowing at about the same time. It was observed that after each grazing the proportion of sunn hemp decreased in the pasture. This is reflected in the rapidly decreasing value of the chemical composition of the pasturage given in Table IX. The grazing capacity did not decrease with each grazing, indicating that the sunn hemp must have benefited the graminaceous crop.

SUMMER CROPS FOR GRAZING AND HAY PRODUCTION.

The sunn hemp-babala mixture appeared to have a higher grazing capacity than the sunn hemp-Sudan grass mixture, but a longer growth period was required.

Where lands are not infested with witchweed (tooiblom), Sudan grass can be grown with sunn hemp for sheep grazing. Where there is a likelihood of witchweed infestation, and for grazing by cattle, babala should receive preference. Any surplus growth of the sunn hemp-graminaceous mixture could also be cut for hay.

TABLE IX. - *Sunn hemp-graminaceous mixtures.*

Grazing.	SUNN HEMP + BABALA.				SUNN HEMP + SUDAN GRASS.			
	Growth period (days) before grazing.	Sheep-days per morgen.	Per cent. protein.	Per cent. P_2O_5 .	Growth period (days) before grazing.	Sheep-days per morgen.	Per cent. protein.	Per cent. P_2O_5 .
First.....	64	11 tons hay	20.27	0.52	49	603	18.41	0.56
Second.....	60	1,116	13.14	0.65	32	775	14.99	0.49
Third.....	40	1,105	8.76	1.08	37	730	8.98	0.56

Of the annual summer legumes, the upright and procumbent varieties of cowpeas grown at Dospertfontein were very susceptible to eelworm; soya beans were less susceptible and velvet beans and sunn hemp were found to be immune to eelworm attack.

Weeds were a serious problem where the crops grown under irrigation were grazed. Without cultivation, and even hand weeding, cowpeas and soya beans were not able to compete with weeds, but velvet beans, if assisted during their initial period of slow growth, were able to overcome the later germinating weeds. Sunn hemp, on the other hand, with its fast erect-growing habit, suppressed weed growth, even without cultivation.

Where weeds are excessive and eelworm prevalent, as frequently found in tobacco farming under irrigation, it would be advisable to grow sunn hemp or velvet beans as the hay crop in the rotation.

It has been reported (Naude, 1946) that sunn hemp is liable to suffer from a wilt disease, particularly when it is grown on the same area in successive seasons. Under such circumstances it may be desirable to grow velvet beans in conjunction with mealies. The mealies can be harvested for grain and the mealie-stalks plus velvet beans either grazed or ensiled.

Where the area is free of weeds and eelworm, upright cowpeas can be grown as the hay crop.

The incorporation of a leguminous crop into the rotation of wheat and tobacco, as practised to-day under irrigation by most farmers in the warmer areas, will not only provide valuable fodder for the winter but, in addition, will have the effect of increasing even to the extent of doubling the yield of the ensuing wheat crop.

However, it is very unlikely that any of the annual legumes can surpass lucerne as a hay crop under irrigation. Lucerne has the advantage that it is a perennial crop capable of yielding several cuts of hay.

A mixture of lucerne and paspalum grass was also tried as a grazing crop. Although there was practically no paspalum in the pasture at first, it increased rapidly at the expense of the lucerne from the second year onwards. A permanent pasture of this nature proved of great value in tiding over any feed shortages that occurred at the change-over from one season to the other.

Incidence of Bloating on Lucerne.

Lucerne was grazed by sheep with varying results at Losperfontein. Satisfactory results were obtained with dry sheep and pregnant ewes, but when lactating ewes with their ravenous appetite grazed growing lucerne, frequent cases of bloating occurred with fatal results. It appears that two conditions are necessary for bloating to occur: (1) a high sugar content in the ingested material, such as may be found in the leafy tops of young lucerne, whether wilted, bruised, frost-bitten or not; and (2) a rapid consumption of large quantities of such lucerne, as occurs when fasted, lactating or fast-growing animals enter a lucerne land.

Bloating is due to the excessive production of gas during the rapid oxidation of sugar by yeast cells. In the case of lucerne the normal eructation of the gas is impeded by excessive foam production in the rumen due to the presence of saponin (Quin, 1943).

The stomach contents of the sheep which died from bloating were found to consist of a foaming, frothy mass with practically no collection of free gas, as may occur in the case of cattle. This explains why it was found so difficult to relieve the bloated condition in sheep, either by the use of a probang, or trocar and canula. The administration of turpentine (2 teaspoons in half a cup of raw linseed oil) by means of a stomach tube was found to be helpful in relieving bloating. Clark (1946) explains that turpentine does not prevent bloating, but that it serves to break the foam by its physical action on surface tension.

Where bloating is likely to occur, it would be advisable to give the susceptible animals a feed of hay, or some other grazing crop, before they are allowed on to the lucerne lands. This will lessen the rapidity of lucerne consumption by animals with ravenous appetites, and, according to Clark and Quin (1945), the roughage thus obtained in the rumen acts in a mechanical way on the texture of the ruminal contents by preventing the formation of a frothy, glutinous mass, and by allowing more gas to escape from the ingesta.

Rôle of Irrigation Farming.

In determining farming policy on the irrigation settlements the foremost issue of national importance to be decided is whether irrigation farming should be regarded primarily as an entity on its own, or whether it should be planned in conjunction with dry-land farming so that the products of irrigation farming can be utilized to supplement our dry-land farming.

The next problem of fundamental importance is whether livestock husbandry should form an essential part of irrigation farming for the maintenance of soil fertility and soil health. However, when

considering these problems, the economic aspect must be borne in mind as well. The settler, farming under an irrigation scheme to-day, is confronted with the problem of whether a mixed farming system including livestock would be as profitable as the present cash-cropping system.

Livestock and Fodder Production.

The production of cash crops such as tobacco, wheat and vegetables is likely to remain the main source of income to the irrigation farmer for some time. It is felt, however, that a more diversified farming system, including the production of fodder crops, and particularly legumes, should be undertaken. Such crops will not only assist in maintaining soil fertility and soil structure but will also be a reliable source of animal feed. It has still to be investigated whether the fodder crops should be utilized by animals on the irrigation settlements or diverted elsewhere to supplement the feed resources of our dry-land farming during the annual winter period of scarcity and to serve as an insurance against the periodic droughts in South Africa, i.e. for the establishment of fodder banks.

It has been seen earlier in this article that, in general, the winter crops had a greater grazing capacity and showed a better utilization of water (irrigation and rainfall) than the summer fodder crops. The winter months coincide with the period of greatest production by the animal in such areas; e.g., it was found at Losperfontein that suckling lambs and young sheep made considerably better growth during the winter than during the hot summer period. Similarly, in controlled experiments Regan and Richardson (1938) have shown that milk production in dairy cows declined with temperatures rising above 80° F.

Where the animal factor is introduced into irrigation farming in the warmer areas, it would thus be advisable to concentrate on maximum production by the animal during the winter months. It will then be possible, for example, to supplement and stabilize the production of such an essential food commodity as milk to a greater extent than is at present the case in the summer-rainfall area. For this purpose grazing crops, such as oats and vetches in the winter, and, to a lesser extent, babala and sunn hemp in the summer, can be grown.

Highly productive animals, such as milch cows and ewes producing sucker lambs, will utilize the abundance of succulent feed efficiently only whilst producing milk but not during the periods of non-productivity. During the periods of rest the non-productive animal should be maintained on cheap feedstuffs. The dairy cow has a relatively short non-productive period, viz. two months out of every year, whilst the ewe, after producing a marketable sucker lamb within four months, is relatively unproductive for the remaining eight months of the year. It is for this reason that the dairy cow is more likely to be an economic proposition on irrigation settlements, where the amount of cheap land not under irrigation is limited. Sucker-lamb production, on the other hand, may play a more important rôle in those irrigation areas where there is a relatively large amount of cheap grazing land available.

The area under irrigation in South Africa is likely to increase in the future as the importance of irrigation farming in relation to our relatively unstable agriculture is more fully realized. Whether such

irrigation schemes should be regarded merely as a means of providing settlement for a number of people, or more as a means of supporting and stabilizing the whole agricultural structure in South Africa, is an issue which requires the most serious consideration.

ACKNOWLEDGMENTS.

A special word of thanks is due to the Division of Chemical Services, Pretoria, for their willing and valuable assistance in undertaking the chemical analyses of the pasturages and hays.

The research work at Losperfontein was under the direction of the Division of Agricultural Education and Research. The Director and Principal Animal Husbandry Officer, as well as the staff at Losperfontein, are to be thanked for their interest and co-operation.

REFERENCES.

- DU TOIT, J. J.—Cultivation of Soybeans. *Farming in South Africa*, Jan. 1942.
DU TOIT, J. J.—Sunn Hemp and its Uses. *Farming in South Africa*, Oct. 1942.
SAUNDERS, A. R.—Soya Beans, Cowpeas and Other Legumes. *Farming in South Africa*, April 1944.
SAUNDERS, A. R. *et alia*.—Soya Beans in South Africa. *Dept. Agric., Bull.* 240, 1943.
-

The Nutrition of Poultry.

IN a recent bulletin on the above-mentioned subject, Prof. A. M. Gericke, of the Agricultural Research Institute, gives special attention to (a) maintenance of the body, (b) growth of the chicks, turkeys and ducklings, (c) egg production and reproduction, (d) prevention of nutritional diseases, and (e) the fattening of poultry.

The bulletin is divided up as follows:—

- (1) General discussion of nutritive requirements.
- (2) Influence of certain ration constituents upon the growth of chicks.
- (3) Influence of rations upon health and egg production.
- (4) Feed consumed by different classes of poultry.
- (5) Computation of poultry rations.
- (6) Management and systems of feeding.
- (7) Green feed and silage for poultry.
- (8) Miscellaneous, such as influence of feed on egg-yolk colour, cannibalism, crooked breast bones, and the feeding of sulphur and tobacco dust.

This bulletin, No. 260, is obtainable from the Editor, Department of Agriculture, Pretoria, at 6d. per copy, prepaid.

Contouring by Farmers Themselves.

N. J. van Straaten, Lecturer in Engineering, College of Agriculture, Cedara.

THE growing interest in conservation farming has resulted in numerous requests for assistance from farmers who wish to have their fields contoured, but owing to the present shortage of field officers they have to wait so long to have the work done for them, that in desperation they attempt the task themselves. Having

Levelling Outfits for Farmers.

In order that farmers may help themselves in the surveying of anti-erosion works, the Director of Soil Conservation and Extension has made arrangements for the local manufacture and sale of reliable, but cheap, instruments. The outfit consists of a telescopic dumpy level with tripod, levelling staff and instructions. It will be obtainable from the Division of Soil Conservation and Extension, P.O. Box 965, Pretoria, against a remittance of £10, accompanied by a certificate from the local Magistrate or Extension Officer, indicating that the applicant is a bona fide farmer.

little knowledge of the method of procedure, however, they can quite easily go wrong by giving the structures too great a fall, spacing them too far apart, or not taking precautionary measures where necessary.

The object of this article is to lay before farmers some of the major points of consideration in order to give them an idea of the procedure to be followed in setting about the task. From this it will be clear that it is futile to depend upon eyesight alone in laying out contours and that a certain measure of precision is required within tolerable margins. As no two farms or even two fields on the same farm can be treated identically, however, the farmer who feels that his fields need special treatment, should wait until a field officer who has the necessary practical experience in such matters, can assist him.

There are three methods of treating cultivated lands, namely (a) the use of grass strips, (b) the throwing up of contour banks, and (c) the construction of broad-based or magnum terraces.

Grass Strips.

The use of grass strips is by far the cheapest and easiest means of protection in that there is no labour attached to them other than the setting out of the strips on the contour. Where grass grows prolifically and soils have a good structure enabling them to absorb large quantities of water, where the slopes are not too steep, and where heavy thunderstorms are not prevalent, these grass strips will afford good protection, provided they are made wide enough. Having the strips too narrow is possibly the biggest mistake generally made. Grass strips *must be wide* to retard the flow of water. The minimum width should be 10 feet, though the average is usually 15 feet. Where the topography is irregular, special attention must be paid to ensure that the grass strip does not become too narrow at certain points in its length. The wider these grass strips are, the better, and they can be laid down in the form

of pastures from which hay can be obtained, and so be made to fit into the farming system. This procedure will enable us to approach the climax of soil conservation technique, as practised in older countries, whereby alternate contour intervals are allowed to remain under permanent grass for a number of years, because perennial grasses are known to play a multifold rôle in the re-vitalization of exhausted or otherwise run-down soils. After a number of years such leys are cultivated again and others laid down in rotation. By allowing the leys to take up the irregularities between the theoretical contours we have the advantage of cultivating parallel strips of field in between, thus avoiding the working of wedge-shaped pieces and the undesirable trampling and consolidation of the soil at the turning-points.

Grass strips are usually surveyed dead on the contour, that is, the top edge of the strip. This permits of any run-off water being evenly distributed over the grass.

The spacing of the strips will depend to a large extent on the rainfall, structure of the soil, and the slope, but should preferably not exceed a 6-foot vertical fall. Here experience is the only safe guide.

Contour Banks.

As the name implies, banks are either thrown on the contour or are given a slight fall to discharge run-off water to one or both sides of the field. In the construction of these banks a drain is formed on the top side. A Martin ditcher or a home-made V-drag is used for constructing them. Here too, rainfall, soil type and slope must be taken into consideration to decide whether the banks must be level throughout their length or given a fall, and what the fall should be. Many farmers prefer level contours, since no measures need be taken for the disposal of run-off water. The soil must therefore absorb all the rain water that is likely to fall on the lands. Theoretically, then, level contours are indicated where the rainfall is low, the slope of the terrain very gentle, and the soil capable of absorbing all the probable rainfall. In practice, however, this is not always true, since a very heavy precipitation may occur once in four or five years, and it may be advisable to have a graded contour. Nevertheless, level banks have been constructed in high-rainfall areas with excellent results.

When the contours are graded, the first essential is to ensure that the discharged water can safely be disposed of. This water can be turned on to well-grassed veld, where no dongas are present in the vicinity, and where the water can be distributed evenly over a large area, or it may be turned into a well-established plantation.

It must be emphasized that it is a simple matter to accumulate water, but it is not always so easy to dispose of a large concentrated volume of water without causing soil erosion if the topography, soil and vegetation do not lend themselves to "rough handling". In many cases it becomes necessary to take further precautionary measures to distribute the water. Sometimes it is found advisable first to prepare a water-way by planting a suitable binding grass a year or two before the contours are constructed, or even to erect checks in the form of concrete, stone or brick barricades to dispose of water discharged by the contours. It is quite possible that the construction of graded contour banks can cause bad donga erosion if care is not exercised in the disposal of the water discharged by them. A few such cases are known.

In setting out these graded contours, care should be exercised that they are not made too long. The accepted principle is that

they should not be longer than 1,600 feet, preferably 1,200 ft. if discharging in one direction only. If they are longer, it is best to grade them so as to discharge in two directions, in which case the maximum length of the contour can be 2,400 feet or at the utmost 3,200 feet.

With regard to the fall or grade of the contour, the following grades are given as a guide, but it may be found necessary to bring about slight changes to meet local conditions:—

For the first 300 ft., give 1 inch fall per 100 ft.

For the 2nd 300 ft., give 2 inches fall per 100 ft.

For the 3rd 300 ft., give 3 inches fall per 100 ft.

For the 4th 300 ft., give 4 inches fall per 100 ft.

It will be noted that the grade increases as the length of the contour increases. This permits of the larger volumes of water which will accumulate towards the end of the contour, being removed more rapidly.

Often comparatively short contours are given a uniform grade throughout their length. In firm soils the fall should preferably not be greater than 4 inches per 100 feet, but for lighter soils 3 inches per 100 ft. is usually given.

A very common mistake made in contouring a field is to space the contours too far apart. The object of contouring is to divide the slope into short sections, so that the water which does fall on the strip between the contours, cannot gain volume and thereby sufficient velocity to carry with it particles of soil. If the length of the slope between the contours is too great, one finds that the contour drains soon silt up. The spacing of contours depends largely on the slope of the field, and one should never space them a definite number of yards apart, but rather give a certain vertical fall from one contour to the next. A useful formula to use for this vertical spacing is:

$$\text{Vertical fall} = 2 + \frac{\text{percentage slope}}{4}$$

Thus, if the average slope of the field is 8 ft. per 100 ft. (or 8 per cent.), then the vertical fall between the contours should be $2 + \frac{8}{4} = 2 + 2$, i.e. 4 ft. If the soil is not depleted of humus and still has a good structure, the vertical spacing can be increased to V.F. $2 + \frac{8}{3}$ feet. Lands with greater slope than 12 per cent. should preferably not be cultivated, but rather be put down to permanent grasses or trees.

Always commence contours from the top of the slope and remember that a cut-off drain should be constructed above the field to prevent run-off water from adjoining slopes from reaching the land. This drain must be well constructed and given the same fall as the contours. The same precautions with regard to the discharge should be taken as for the contours.

When constructing contour banks remember that the wider the drain, the better the production afforded to the land. A wide drain has the added advantage that the velocity of flow of the water is reduced, thus preventing scouring of the drain and permitting the soil to absorb more water, besides offering a greater area of absorption. The minimum width of the drain should be 5 to 6 ft., and the bank must be 18 inches to 2 ft. high, measured from the lowest part of the drain.

Broad-based or Magnum Terraces. *

The method of setting out these terraces is identical with that described for contour banks. The difference between the two is

* See June 1946 issue of *Farming in South Africa*.

that with the contour bank a strip of land about 10 to 12 feet, that is the drain and bank, is lost to cultivation, while in the case of the broad-based terrace the whole area inclusive of the drain and bank can be cultivated. In this case the drain is from 12 to 16 feet wide and the bank about the same width, and the bank and drain so proportioned that any implement can be worked over them.

The Care of Contour Banks and Terraces.

Sometimes these structures break within the first two seasons after being constructed, the main reason being that the soil on the banks has not firmly settled, or, as is more commonly the case, that after construction the drains have high and low spots which cause the water to accumulate in sections instead of flowing away steadily. The farmer should therefore inspect all contour structures after the first rains—when the flood marks are clearly visible—to locate high spots, which must be cleared out by hand, and to build up and strengthen points where the banks are low.

If it is possible, the drains should be checked for grade immediately after each one has been completed, when such high and low spots can be rectified immediately.

Once the water flows steadily in the drains, correct ploughing will ensure that the banks require very little further attention.

Melon-fly as a Pest of Granadillas :—

[Continued from page 796.]

known as leaf and fruit spot disease of granadillas. The symptoms of the disease differ from fly injuries in that the former usually occur only during damp misty weather. Only *mature* fruits are attacked by the disease, and affected fruits develop spots which are large and of a yellowish-brown colour. Within the sunken lesion, light greyish-black concentrically arranged spores may be seen, and this is well illustrated in Figure 3.

For the control of this disease the Division of Botany and Plant Pathology recommends either spraying with Bordeaux mixture (8 lb. in 50 galls.) plus spreader, or dusting with copper-oxichloride, two parts in one part of talc.

The Horse on the Farm.*

IV. Mechanics of the Horse.

Dr. P. J. v. d. H. Schreuder and F. B. Wright, Senior
Professional Officers (Horses).

THE working life of any machine depends on the quality and smooth functioning of all the component parts. Similarly, the skeleton of the horse contains numerous joints, hinges and levers whose wearing qualities and true movements vitally affect its working life.

Before discussing the more important defects, blemishes and unsoundnesses, it will be profitable to consider some of the more mechanical aspects of certain joints and limbs, more especially the feet and legs.



FIG. 1. A splendid representative of the saddle-horse classes competing at numerous American horse shows, with 50,000 dollars prize money. Note the perfect formation of the animal's limbs, style, quality and substance. (*The National Horseman*, Sept. 1946.)

The perfect formation of the limbs is one in which all four legs are straight as if hanging vertically from the corners of the body.

Any deviation from a straight and true position causes friction and undue strain which not only interferes with correct action, but ultimately results in the familiar defects and unsoundnesses that detract from the usefulness of the horse and shorten its working life.

* This article is the fourth in the series, the first, second and third having appeared in the September, October and November (1946) issues of *Farming in South Africa*.

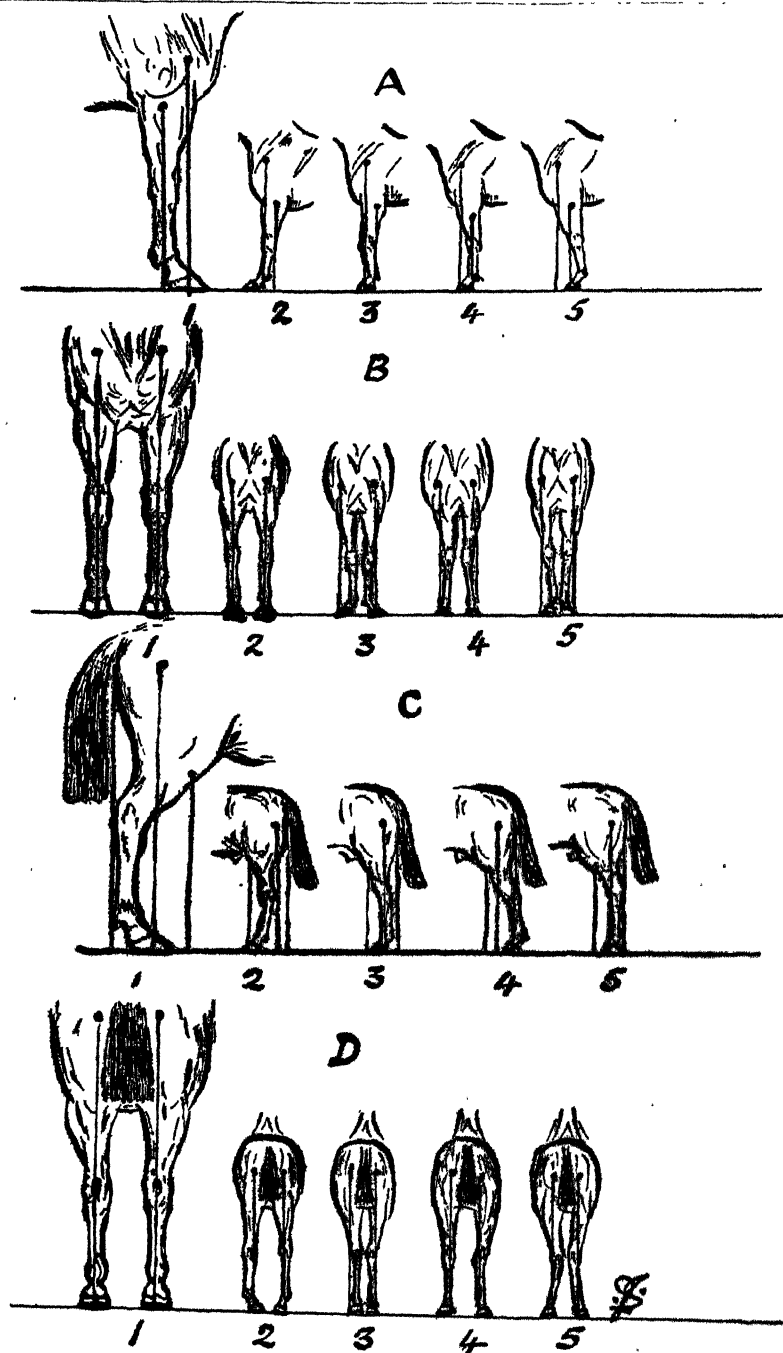


FIG. 2.

Side (fore quarter).—A1, correct position indicated by a plumb line; A2, standing over; A3, over at knees; A4, calf-kneed; A5, standing under.

Front.—B1, correct position; B2, pigeon-toed; B3, toed out; B4, knock-kneed; B5, toed in.

Side (hind quarter).—C1, correct position; C2, sickle hock; C3, standing under; C4, standing back; C5, straight hock.

Back.—D1, correct position; D2, bow-legged; D3, narrow hocked; D4, wide hocked; D5, cow-hocked.

In the accompanying diagrams A, B, C and D, the true positions are given in 1, while the abnormal positions are indicated in 2, 3, 4, and 5. Plumb lines dropped from centres just above the limbs divide them evenly down to the fetlocks from the sides, front and back. The distance between the limbs should be moderately wide--about the space of another limb a too narrow or too wide position being undesirable.

The good foot is hard-hoofed. The fore feet are slightly larger and rounder since they carry more weight, while the hind feet, which do more propelling, are slightly smaller and more pointed. Size of feet is determined by the kind of work a horse performs. In the draught horse they are larger for a better grip on the road. Whatever the size, the feet must be well shaped and touch the ground evenly. Flat feet, narrow feet and low heels are undesirable, even if these faults are remedied by proper shoeing.

The pasterns are moderately long and sloping, with an angle of 50 and 55 degrees in front and hind feet, respectively, in an imaginary line from the centre of the fetlock. Deviations from the normal would be a stumpy (sp.) or sloping (sl.) position. The stumpy condition is most often associated with a short pastern and the sloping condition with a long pastern.

The abnormal formations shown in Fig. 2 are due to lack of breeding and very often to malnutrition or to a deficiency of a certain mineral or other constituent of feedstuffs. By careful observation and timely attention, many of the abnormalities in feet can be rectified in foals.

The length of the useful life of a hard-working horse is rarely measured by its potential life span, but rather by its ability to stand up to exacting conditions without some or other portion of the body giving way to the strain imposed by work. Thus, an inferior young horse working on hard city streets might have developed an incurable ringbone by the age of six years. The fact that the horse might live to twenty-five years of age if turned out to pasture, is of no importance at all. What really fixes its value is the fact that its working life was only of one or two years' duration.

Conformation and Nutrition.

The factors that exercise the greatest influence on the working life of a horse are conformation and nutrition.

Conformation. This is largely a question of mechanics. It is not difficult to realize that a horse that takes more weight on one side of the foot and limb, either while standing or during progression, as, for example, in the case of a pigeon-toed horse or one that turns its toes out, has an uneven strain transmitted to the lower joints and ligaments of its limbs, certain parts of which fail to bear their full share of stress while other parts are overtaxed and may ultimately give way.

In a truly conformed and true actioned horse, strain is harmoniously distributed. There is no overtaking of any one part, and the risk of breakdown is much reduced.

Again, in a horse with good length and slope of pastern, jar and strain on the limb is absorbed to a great extent by the mechanical play of the fetlock joint and the suspensory apparatus of tendons and ligaments of this region. A short, upright fetlock handicaps the anti-concussion mechanism of the fetlock joint, and the forelimb has consequently to stand considerably more jarring and concussion.

As the points of the horse have already been discussed earlier in this series of articles, the different types of conformation that predispose a horse towards certain unsoundnesses, will not be enumerated again.

Nutrition.—It is obvious that a poorly nurtured horse cannot stand up to the strain of hard work, but it is not so obvious that a horse getting plenty of food may nevertheless be starved of certain essentials, the lack of which may contribute materially to the development of unsoundnesses. As most unsoundnesses in horses are associated with the bones and ligaments of the limbs, it follows that anything which affects the health of the horse, is an important factor in determining soundness or otherwise. In this respect the quantity and ratio of calcium oxide and phosphorus pentoxide in the feed is of paramount importance. Veld grazing will almost always be lacking in available calcium and phosphorus, and grazing animals may well be fed from one to two ounces of a mixture of calcium carbonate and calcium phosphate in a ratio of 1 to 1.5 per day.

When horses receive large quantities of maize, bran and oats, an excess of P_2O_5 may be absorbed into the system and in order to maintain a correct $CaO:P_2O_5$ ratio, calcium is withdrawn from the bones, which become comparatively soft and spongy and unable to stand the jar and stress of work. Furthermore, the fibres of the ligaments may be more easily torn from their points of insertion in the softened bones, with consequent inflammation at these sites.

Therefore, where horses receive a rich grain diet, one to two ounces of calcium carbonate only should be fed to counteract the excess of P_2O_5 in the food.

Recognizing Unsoundnesses and Blemishes.

Men who do not constantly handle large numbers of horses are not likely to become adept in recognizing the more obscure forms of unsoundness, but there is no reason why a capable horseman should not recognize many of the commoner unsoundness and blemishes of horses.

In examining a horse for soundness, a well defined procedure, such as the following, should always be adopted.

The horse in question is made to stand square on all four legs by an attendant, and is then viewed at a distance of three to four paces from front, side, and rear. Such a general examination will reveal obvious defects of the eyes, deformities of the face, inequality of size of joints and feet, well developed ringbones, sidebones, spavins, curbs, injuries, capped elbows and hocks, etc.

After this general examination, a more thorough and detailed check is made, and, if any of the conditions described be met with, the horse should be rejected.

The Eyes.

The eyes should be examined first. Marked opacity will, of course, be obvious immediately. Often, small opaque areas are met with in the cornea, and their position and the type of horse in which they occur, will determine their seriousness. Thus, a small opacity opposite the pupil of the eye of a polo pony is an obvious unsoundness as it will interfere with the pony's vision and may cause it to shy off during a game, but such a defect would not be of such serious account in a heavy cart horse working at a walk in town, and still less so in a heavy horse working away from traffic on a farm.

The pupils of both eyes should be of the same size. In bright light they will be narrow and elongated in shape. Their size will increase considerably in a semi-dark stable. This increase and

decrease in the size of the pupil takes place immediately, according to changes in the degree of intensity of the light, and can easily be observed.

A horse whose pupils remain distended in bright sunlight should immediately be rejected.

Opacities within the lens or posterior chamber of the eye can best be looked for in a darkened stable by flashing the light of a torch on to a mirror which is so directed that the reflected light is played on to the eye to be examined.

Face.

Bilateral swelling of the face is most often associated with *osteofibrosis* or "bone disease". In this condition, the lower jaw-bones are generally swollen as well.

Unilateral swelling of the face, when associated with a purulent discharge from the corresponding nostril, indicates sinus trouble, which can be cured only by skilled veterinary attention.

Facial paralysis caused by paralysis of the facial nerve is diagnosed by a drooping ear, eyelid and lip of the affected side.

Teeth and Jaws.

It is always as well to open a horse's mouth when examining for soundness to see that it is not "parrot mouthed"—a condition where the upper incisor teeth overlap the lower, and make efficient grazing difficult. As breeding animals will transmit this condition to a certain percentage of their offspring, they should be rejected.

Do not omit to examine the back teeth. The molars often wear very unevenly and are a common cause of unthriftiness in horses. Sharp edges to the molar teeth can easily be removed by rasping, but correction of pronounced uneven wear must be left to a skilled veterinary surgeon, who, although he may be able to improve matters, cannot restore to normal the condition of the teeth.

Fistulae, i.e. passages extending into the bone of the lower jaw and opening to the exterior along its lower edge, are sometimes encountered. They will be found in the space between the incisor and molar teeth, or communicating with one of the molar teeth. Treatment is not possible by the layman. Moreover, the first condition is generally caused through abuse of the bit, with pronounced injury to the sensitivity of the horse's mouth on the affected side.

Head.

Growths.—One sometimes sees horses with growths (tumours) attached to various parts of the head. Sometimes these can be surgically removed, but often they recur after removal so that a layman should not entertain the idea of buying a horse so affected. Grey horses often show the presence of tumours, known as *melanomata*, under the skin. These often increase in size, and, if they occur in the throat region, may interfere with breathing through occlusion of the pharynx.

Poll Evil.—This condition is found on the upper surface of the neck just behind the ears. One or more openings which discharge pus are found an inch or more below the level of the mane. Skilled operative treatment is essential to effect a cure.

Withers.

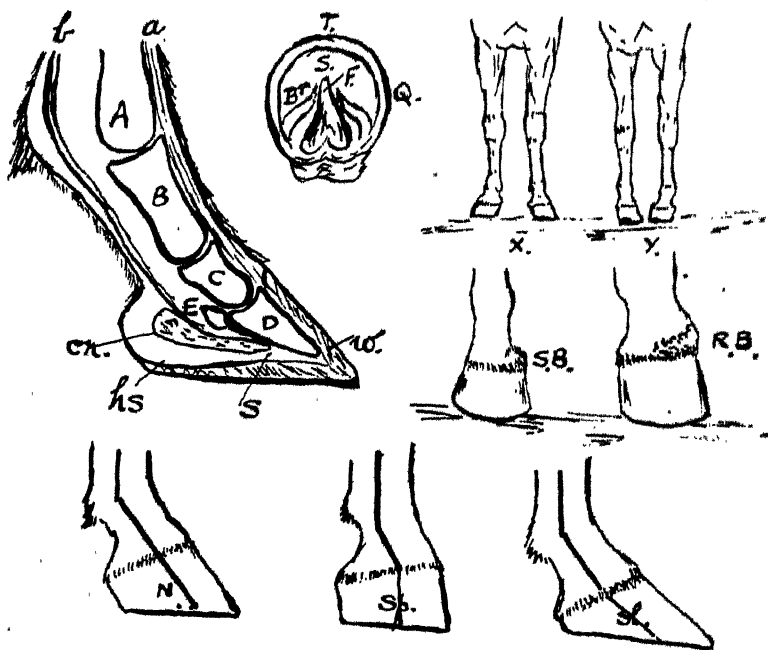
Fistulous Withers.—This condition is somewhat similar to poll evil and, as its name indicates, affects the withers. It is invariably caused by an ill-fitting saddle which, by pressing on the withers, causes injury to the skin and underlying bony structure of the withers. This is followed by pus formation, and as the pus has no outlet, it burrows down along the layers of connective tissue between the muscles, and, following the line of least resistance, breaks through the skin at various points below the withers. The condition is a most persistent one and shows no tendency to clear up without specialist treatment.

Breast.

Breast Boil.—This is a fistulous condition of the skin and underlying tissues immediately above the point of the shoulder. As in the lastmentioned two cases, it needs operative treatment to effect a cure.

Forehand.

We now come to the close examination of the front limbs. The shoulder joint is frequently suspected by laymen of being the seat of lameness in horses. In actual fact, shoulder-lameness is not so common as is generally thought, and presents, even to experts, the greatest difficulty in diagnosis. The layman, therefore, need not pay undue attention to this joint, but get on with the examination of the remainder of the limb. This he does by standing opposite the near fore limb, facing in the same direction as the horse. The right hand is then run down over the knee when any fibrous or bony-thickening will be noted. If in any doubt as to the presence of slight enlargement, it is wise to go round to the off side and compare the

**FIG. 3.**

A, cannon bone; B, *Os sufraginis*; C, *Os coronal*; D, *Os pedis*; E, *Os navicularis*; a, b, c, tendons; W, hoof horn; hs, horny sole; cn, cushion; S, sensitive sole; T, toe; Q, quarter; Br, bar; F, frog; S, sole; X, toe out; Y, toe in; SB, side-bone; RB, ringbone; N, normal; Sp., stumpy; and Sl., sloping.

feel of the off knee. Inequality in size is invariably associated with abnormality.

One must stress the fact here that the man who aspires to judge the abnormal limb, must first thoroughly acquaint himself with the feel of a sound limb and should miss no opportunity of running his hands over the limbs of young sound horses.

The knees of old horses that have done a considerable amount of galloping will often not have the same clean feel as those of a young horse, but any marked thickening or inequality in size and shape must be regarded with the greatest suspicion.

The knees should also be examined for scars—indications as to whether the horse has been down on its knees.

After an examination of the knee, the hand is passed down over the cannon with the object of discovering splints.

These take the form of bony enlargements varying greatly in size, and generally clearly visible to the eye, being situated at the side of the cannon bone between the large and the small splint bones. When situated just below the knee, they must be regarded seriously, as they may interfere with free movement of the knee joint, but when situated lower down, they cause no ill effects and may be regarded as blemishes and not unsoundnesses.

Bony projections (exostoses) may occur on any portion of the front surface of the cannon as the result of knocks, but hardly ever cause any permanent lameness.

The fetlock joint is felt in much the same way as the knee, particular attention being paid to any scars low down on the posterior portion of the inner surface of the fetlock joint—evidence that the horse strikes this portion of the joint with the opposite fore-foot during the walk or trot (brushing).

The hand is now carried down over the pastern, and the thumb and forefinger run round the coronet. About two-thirds of the way down the pastern on either side is the proximal interphalangeal joint. Its presence is not indicated by any marked external appearance, the pastern having the appearance of containing only one bone. However, the joint is there, and the bone and ligaments in its immediate neighbourhood are often subject to inflammation, with subsequent bony enlargement—a condition known as ringbone. The condition is also found round the coronet itself; in this case it is the distal interphalangeal joint that is involved.

In all horses the head of the lower bone forming the pastern can be felt on either side of the pastern, and in some horses this enlargement is better developed than in others. This normal condition must not be mistaken for ringbone. If there is any doubt, a comparison with the other joint will be helpful because, although it is possible for a horse to be suffering from ringbone in both fore pasterns, it will not be a common occurrence.

The Foot.

Laminitis.—In cases of chronic laminitis, the hoof will show marked rings round the wall. There will be a greatly increased growth of horn at the toe, and the front profile of the hoof will be concave. The condition is a definite unsoundness.

Sand-crack.—Sand-crack is a crack in the wall of the hoof, extending upwards from the bearing surface to a varying degree—in some cases right to the coronet. Many horses that run at grass and whose feet are brittle and in poor health, frequently show cracks in

the hoof-wall extending upwards for varying distances. Such cracks grow out when the foot receives proper attention, and are of no importance.

A crack extending well up into the hoof and deeply into the horn must be regarded with suspicion as it is liable to extend into the sensitive structures of the foot. If the horse therefore goes lame as a result of a sand-crack, it is better to leave it alone, because, although much can be done by skilled treatment to restore soundness, the condition is always liable to occur.

False Quarter.—In South Africa, injuries to the coronary band from barbed wire are of frequent occurrence. As the coronary band secretes the horn of the hoof, permanent injury to a portion of this band results in interference with the proper secretion of horn below the injury. The horn secreted is rough and stands out beyond the normal surface level of the hoof. Horses do not generally go lame as a result of such abnormality, so that the question whether such a horse is passed or rejected, must depend on the extent of the injury.

To continue the examination of the limb, it is necessary to turn round and face to the rear of the horse.

Capped Elbow.—This will no doubt have been noted in the general examination of the horse. It is a persistent condition, and large lesions can be removed only by surgical interference. It consists of a pocket of fluid over the point of the elbow.

Girth Galls.—While dealing with this region it is as well to examine the skin behind the elbow for signs of extensive girth galling, which will show by thickened, indurated skin or extensive scar formation.

If the horse's conformation is such that the girth must constantly press against the play of the elbows, the horse should be rejected.

Sprained Tendons.—The next move is to examine the tendons. This is done by running the thumb and fingers down each side of the tendons to the bottom of the fetlock joint. Any thickening of the tendons is evidence of previous sprain. Comparison of both fore legs should be resorted to in cases of doubt. A horse that has recovered from a sprained tendon, may go perfectly sound, but as the tendon has been weakened and the sprain is liable to occur again, the horse must be regarded as unsound.

Sesamoiditis.—As the fingers are run down the tendons, the latter appear to expand to form the back of the fetlock joint. Actually there are two small pyramidal bones embedded in the tissues here and connected to the cannon bone by fibrous bands or ligaments. A considerable portion of the suspensory ligament is attached to these small bones, and the whole apparatus constitutes an important shock-absorbing mechanism of the limb. It is subject to great strain and often the ligaments are sprained at their seat of attachment to the sesamoid bones. A hard fibrous swelling in the region is the result. Here again one must know the normal feel of the joint to appreciate the abnormal.

Windgalls.—Above the fetlock joint—between the tendons and cannon bones—puffy swellings known as windgalls may be noticed on either side. The condition does not cause lameness, but is frequently a sign of hard work and one prefers to see a horse without these blemishes.

Splints.—The foot is now picked up and the cannon examined further for splints. In this instance the thumb of either hand is run down the posterior edge of the bone on either side of the tendons. Splints will be readily felt as hard projections. They are of no

account it small, but if they impinge on and interfere with the tendons, they may cause lameness. In such instances they must be regarded as unsoundnesses.

While the foot is raised, it is advisable to see if it is possible to bend the knee sufficiently for the foot to touch the elbow. If this cannot be done, the amount of flexion in the knee is not normal.

Side-bones.—With the foot still raised, the lateral cartilages are felt for side-bone. The lateral cartilages are situated just above the coronet immediately under the skin on either side of the posterior half of the foot. In thin-skinned horses their upper edge can be clearly seen. If the fingers are placed along the edge of the ground surface of the hoof below the cartilages and the thumb placed on the upper edge of the cartilage, it will be found to be quite springy under the pressure of the thumb. Owing to strain and subsequent inflammation these cartilages become ossified, i.e. changed into bone, and their springiness is entirely lost. This condition is known as side-bone. It commences in the hoof where the cartilages are attached to the bone around which the hoof is built (pedal bone), and the ossification extends upwards so that frequently the tip of the cartilage will be movable while the lower portion is bone hard.

Side-bones in riding horses are always unsoundnesses, as they are invariably followed by the development of contracted heels and narrow feet and result in lameness. In slow-moving horses which work at a walk, side-bone often does not cause lameness, especially if the horse has a large well developed coronet and widely separated heels. A side-bone in a horse having the type of foot just described and working on soft agricultural land or farm roads would in most cases not inconvenience the horse. Nevertheless it is an abnormality and undesirable.

Dropped Sole. Next examine the ventral surface of the foot. In a good foot the sole is arched, i.e. presents a concave appearance. Some horses have flat soles. This is undesirable but normal, but if the sole is convex in shape, it is the result of a previous attack of laminitis during which the pedal bone has become loosened from its attachments and now presses on the sole, causing the condition known as dropped sole. This is a bad unsoundness.

Contracted Heels.—In a good foot the heels are well separated and the frog well developed. A poorly developed frog and heels set close together are undesirable, since they indicate poor development of the anti-concussion mechanism of the foot, with consequent strain on other portions of the limb.

Thrush and Canker.—The cleft of the frog should be cleared out. If a blackish, stinking exudate is brought to light, the horse is suffering from thrush. This is a diseased condition of the sensitive tissue from which the horn of the frog is secreted, and may extend to and undermine the horn of the sole of the foot, in which case the condition is known as canker. Both conditions are extremely persistent and require surgical interference to effect a cure.

Barrel.

After the examination of the fore limb the barrel may receive attention.

Saddle Galls.—If the horse is saddled, remove the saddle and examine the back. Superficial abrasions affecting only the skin will heal readily, but any fibrous swellings caused by saddle pressure must be regarded as more serious.

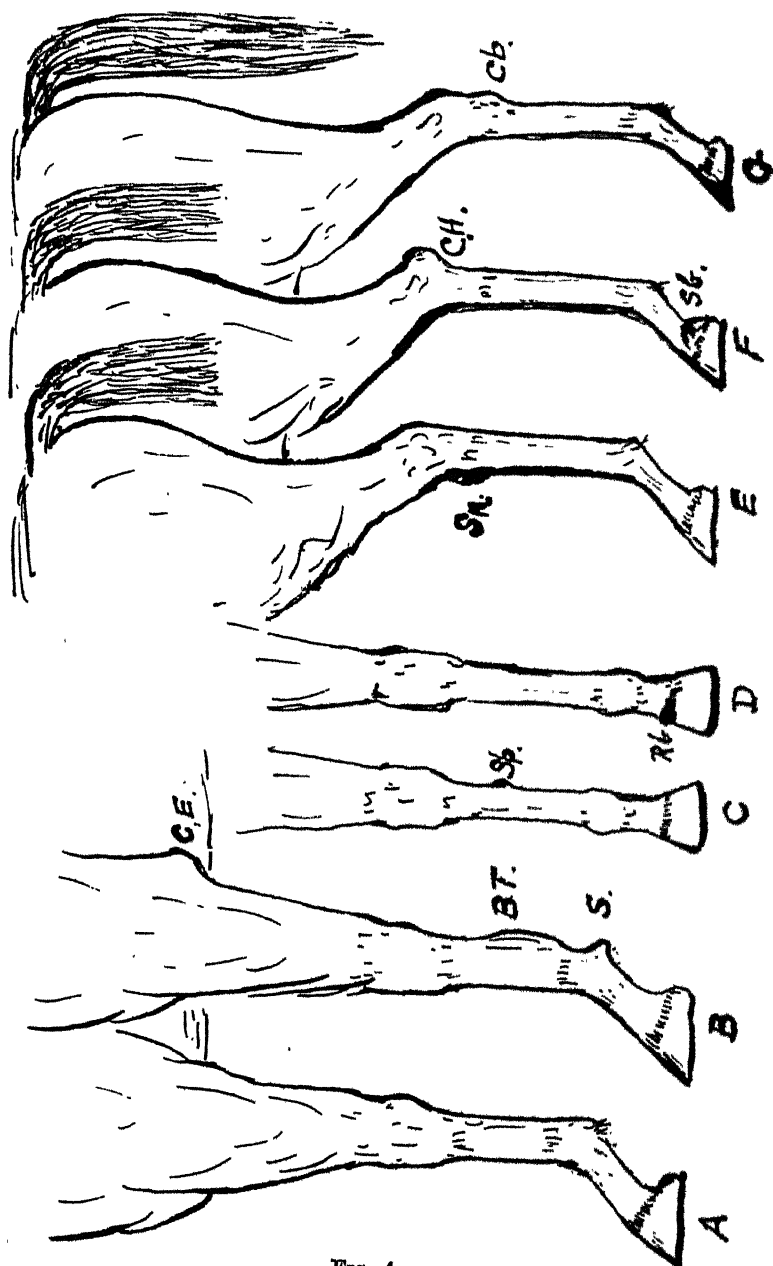


FIG. 4.

A, normal; B, fore leg with capped elbow (C.E.), bowed (sprained) tendon (B.T.), sesamoiditis (S); C, fore leg with splint (sp); D, fore leg with ringbone (Rb); E, hind leg with spavin (Sn) inside lower hock; F, hind leg with capped hock (C.H.) and seat of side-bone, (sh.); and G, hind leg with curb (cb).

Look under the abdomen for possible fistulae and examine the sheath and groin for evidence of tumours and hernia. Tumours will sometimes develop in the sheath and on the penis, and it is as well to insert the hand and withdraw the penis if this is at all possible.

Hindquarters.

The hands are run over the hind limb in much the same manner as in the case of the fore limb, largely to confirm diagnoses that will have been made with the eye in the general examination of the horse.

Unless the horse is well known, it is as well to have an assistant hold up the fore leg on the same side as the hind leg to be examined. The assistant should grip the fore foot firmly, but should not allow the horse partially to support his weight on the assistant's hand, otherwise the safety precaution is largely nullified.

Facing in the direction of the horse, the examiner runs his hand down the front and inside of the hock, after which he proceeds as in the case of the forelimb.

Bog Spavin. This is a large, soft, fluctuating swelling seen on the inner front surface of the hock towards its lower end, and often associated with two smaller swellings on either side in the hollow in front of the point of the hock. Pressure on the main swelling causes distension of the smaller swellings.

It is the result of chronic inflammation of the synovial lining of the hock joint and generally does not cause lameness. If for any reason the inflammation should become acute, marked lameness follows. As this is always a possibility, such horses should be avoided.

The condition is best seen by looking at the hock from a position immediately in front and just to the side of the horse's head.

Spavin (Bone Spavin). This condition can best be seen from the position described under bog spavin. It occurs at the lower inner aspect, just behind the front surface of the hock and immediately above the cannon bone. It is due to strain on the small bones and ligaments of the hock in this region and is a most serious unsoundness.

Thoroughpin. This is best seen from a position at right angles to the hind limb, and appears as a soft fluctuating swelling situated on either side of the large tendon above the point of the hock or just in front of the bone forming the point of the hock and perhaps extending down the inside of the hock, according to the tendon sheath involved in inflammation. At times both tendon sheaths are involved.

Although no lameness may be present, it is possible for it to develop, so that thoroughpin must be regarded as an unsoundness.

Curb.—Curb can only be seen correctly from a position at an absolute right angle to the posterior line of the hind limb. It appears as a swelling on the posterior surface of the hock, the middle point of the swelling corresponding to the junction of cannon and hock. It is caused by a sprain of a strong ligament that runs from the point of the hock to the top of the cannon and binds these parts together. When the acute inflammation of the sprain has passed away, the horse will go sound, but the ligament has been weakened and the sprain is liable to occur again. Unless the correct position is taken up, it is possible to overlook curb. Thus, if the seat of the curb is regarded from a position somewhat in advance of the correct one, the true profile is interfered with by the curvature of the outer surface of the hock.

The swelling must always be confirmed by feel, and this is best done by standing next to the hind leg, facing to the rear of the horse and running the fingers down the back of the leg over the seat of curb.

Curb must be distinguished from thickening of the skin in the region of, or prominent development of, the head of the outer splint bone, both of which interfere with the straight profile of the posterior surface of the hind leg and are of no account.

The examination of the remainder of the limb is the same as for the fore limb. In general, splints, ringbones and side-bones are not as common in the hind as in the fore limbs, but a condition commoner in the hind than front limbs is greasy heel.

Greasy Heel.—This is a chronic inflammation of the back of the pastern accompanied by a greasy discharge. If tackled early, it can be cured, but if of long standing and accompanied by much thickening of the skin, or if associated with thrush or canker, it must be regarded as an unsoundness.

Dock and Vulva.

The root of the tail should now be raised and the dock and (in the case of a mare) vulva examined. Anal fistula, an opening next to the anus and communicating with the terminal portion of the bowel and malformation of the vulva due to lacerations, should be looked for. The lips of the vulva should be drawn apart and if air is sucked into the vagina, there is every likelihood that the mare is a non-breeder.

The examination of the off side must, of course, succeed the examination of the near side.

Dropped Hips.—The horse is now viewed directly from behind. The hips are regarded first in order to discover any inequality. The point of the hip is often fractured in horses by severe blows, e.g. in knocking the point of the hip while passing through a door. Looked at from behind, the flatness of the injured side is most marked. This condition does not cause permanent unsoundness, but detracts from the appearance of the horse.

Action.

So far the horse has been examined in a standing position. He should now be walked some twenty yards directly away from the examiner, turned and walked straight back. The horse's action is noted, especially to see if he is inclined to go so close in front and behind as to be liable to brush. In perfect action the feet are lifted up, brought forward, and put down in a straight line. It is remarkable how few horses have a perfectly true action, so that a horse should not be rejected for slight deviations from the normal. Brushing is, of course, a serious fault and marked dishing indicates an uncomfortable ride in a saddle horse.

The animal is now trotted away from the examiner, then back again on a loose rein at a slow pace. Lameness will be apparent in uneven action. The next step is to ascertain whether the horse is lame in front or behind. Lameness in front is best studied when the horse is coming towards one. The head will drop or nod when the unsound leg comes to the ground.

In lameness behind the hip, the lame side will be carried higher than the sound side and hitched up during progression.

The layman can scarcely be expected to recognize the seat of lameness from the horse's action. He will be doing sufficiently well if he can distinguish a lame from a sound horse. Here again constant observation and knowledge of the normal must precede recognition of the abnormal.

There is, however, one abnormal method of progression that should not escape anyone's observation. In stringhalt, one, sometimes both, of the hind legs are snatched up from the ground to an abnormal

height during progression. In the early stages of the disease this may be seen only in the first few steps. The condition is an unsoundness.

The next action is to turn the horse briskly on his forehand, first to the right and then to the left. Stringhalt which may not be revealed in forward progression, is sometimes discovered in turning. This test will also indicate whether the horse has complete control of his hindquarters, or whether he is suffering from a ricked (jinked) back.

Wind.

It now only remains to test the horse's wind. This is best done by a fast gallop or by lunging the horse, when any roaring or thickness of the wind will be noticed.

When making this test it must be remembered that sometimes a high-spirited horse will make a rattling noise by vibrating its nostrils. The horse invariably does this while he is still fresh and generally leaves off when he gets down to hard work. It has nothing to do with roaring and is not associated with disease in any way.

One final piece of advice in testing a horse for soundness may be offered, and that is to test the horse immediately he comes from the stable. Many forms of slight lameness disappear as the horse warms up with work and will be missed unless this precaution is taken.

Dryland Lucerne and Soil Improvement in the Grain Areas of the Winter-Rainfall Area. :—

[Continued from page 802.]

erosion is very difficult, since the maintenance of contour banks is hampered by the downward movement of the soil resulting from the necessity of always having to plough in one direction. Moreover, the wear and tear on implements used on such slopes, is severe. The obvious solution to the problem of erosion on such soils seems to lie in the establishment of permanent pasture as indicated above—but this cannot be done unless the soil fertility has been built up to such an extent by legumes (lucerne and subterranean clover), and thereby enriched with nitrogen, that grasses may successfully be established there.

Perennial grasses with lucerne and subterranean clover may undoubtedly also be used on lands which are less sloping, as semi-permanent grazing which can, from time to time, be put under grain in a system of rotational cropping. Perennial grasses will not only improve the soil structure, but will also help to counteract soil erosion.

Hot Water Immersion of Oranges to Detect Minute Stings.

H. F. Ehmke, Fruit Inspector, Division of Horticulture.

SINCE packhouse routine is largely concerned with the handling of citrus fruit in such a manner as to ensure its arrival on the markets, whether inland or overseas, with a minimum of decay, the first appearance of stung fruit in the packing shed heralds a period of extra vigilance for those responsible for seeing that only perfectly sound fruits are packed, since it may mean a slowing down of the rate of feeding on to the sorting belt so that as many fruits as possible may be scrutinized. This, in turn, calls for extra supervision on the sorting belt and, if the stinging is severe, it may also be necessary to check each fruit before wrapping it, with the result that the daily output is adversely affected, particularly at a time when the fruit is reaching an advanced stage of ripeness and consequently must be harvested as soon as possible.

Despite all these precautions and because of the difficulty in detecting recent punctures, stung fruits often do get into the bins and are packed. We are not concerned, however, with stung fruits which have reached a stage when it is easy to detect them under ordinary packhouse conditions, but rather with those which show no signs of having been stung. In the initial stages both false codling-moth and fruit-fly punctures are most difficult to detect with the naked eye.

Thus these minute stings are responsible to a large extent for much of the decay reported in our citrus from time to time, especially on its arrival on the overseas markets. Although decay is often due to indifferent sorting, rejections at the ports for wastage and reports of 'wastage overseas are certainly not confined to the consignments of exporters doing slip-shod sorting, but apply also to those of exporters who pack apparently sound fruit only. As an inland fruit inspector, the writer has repeatedly submitted suspected consignments to very careful examination for punctures, but the number of affected fruits it was possible to detect was so small that there was no alternative but to pass consignments as being in sound condition. Yet, when these same consignments arrived at the port of shipment, so many of the minute punctures, undetected in the first instance, had developed waste that it was in most instances necessary to reject the fruit as being in unsound condition. In the past no amount of vigilance on the part of a fruit inspector, or care taken by the exporters concerned, has been able to reduce to a safe minimum the minute punctures responsible for the decay which develops in such consignments on the four or five days' railway journey to the coast. Nor has reconditioning, i.e. repacking fruit rejected at the port for unsoundness due to insect injury, necessarily meant its arrival overseas in a sound condition, because minute punctures are again missed, with the result that fresh decay develops during the voyage. A good deal of wastage overseas, thought to be due, for instance, to climatic conditions prior to and at the time of packing, may possibly have been caused by these very minute stings. Colour is lent to this theory when it is realized that, unlike decay caused by mechanical injury, decay as the result of false codling-moth or fruit-fly injury more often than not develops fermentation and

in time may, through contact with adjacent fruits in the packed case, cause them also to break down.

These punctures, impossible to detect on the sorting belt, are therefore a potential danger, and any practical means of detecting them in the packhouse before the fruit reaches the bins must quite obviously be of inestimable value and assistance to all concerned with packing and marketing.

New Method of Detection Suggested.

The object of this article is to suggest a new method which in practice has proved its effectiveness and which involves only a few minor alterations to the equipment used in most of the larger packhouses in the Union. The method is limited only by the human factor in its efficiency in detecting very minute stings. Even the minutest punctures are caused to show up sufficiently to allow of the affected fruit being culled.

It was found that if an orange is allowed to float in a hot water bath for a sufficiently long period to cause the air inside it to heat up and expand, any splits, cuts or insect punctures in the rind will give off a thin stream of air bubbles in much the same manner as a punctured inner tube when immersed in water. The water must be hot enough to cause the air to escape through the punctures and also be fairly clean to allow the bubbling effect to be readily seen.

A brief description of the hot water bath at the Crocodile Valley Citrus Estates at Mayfern in the Transvaal, where this method was first put into practice with signal success, will perhaps help towards a better appreciation of the method and its possibilities. The bath is a cement tank roughly eight feet long and four and a half feet wide, and was originally installed as part of the washing plant to immerse the fruit in hot water in order to remove any residue from the bleaching bath and also to hasten drying in the drying tunnel.

At the end of the bath where the fruit plunges into the water after leaving the bleaching bath by means of a slatted conveyor, there is a paddle which, turning very slowly, keeps the fruit moving forward until it is extracted by means of another slatted conveyor and taken through the drying tunnel on to the sorting belt. The distance from the paddle to the point at which the fruit is lifted out of the water is about four and a half feet and it is during the time the fruit takes to float this distance that the bubbling effect is observed. The temperature of the water is maintained by steam injection, which is also employed for heating the coils in the drying tunnel. The bath is particularly well adapted for this method of detecting punctured fruit, being well placed in a good light and the floating fruits being readily accessible.

It is not suggested, however, that this particular lay-out is the most suitable and that it should be used as a model. It has, nevertheless, several features to recommend it and one or two disadvantages which, with slight adjustment, would render it more efficient; it should rather be used as a basis for further investigation.

Owing to the fact that the writer's time was more or less fully occupied with routine inspection duties, it was not possible to devote too much time to a careful analysis of the results obtained or to submit them to the organized and careful experimentation they undoubtedly deserve. However, after a study of its practical application and effectiveness under ordinary packhouse conditions,

it was possible to record certain facts and to arrive at some interesting conclusions.

Two packhouses—one in the Nelspruit area and another in the White River area—upon realizing the possibilities of the new method, immediately adapted their hot water baths to include in one process the washing and elimination of stung fruits, with excellent results. These packhouses, so far as is known, are the only ones in the two areas mentioned which have these baths as an integral part of their packhouse equipment.

The whole field of investigation has not by any means been covered, and further research will be necessary in order to determine, amongst other things, the effective minimum and maximum temperatures and to study the application of this new method to other kinds of fruit.

For clearer presentation it is proposed to survey under appropriate headings the work already covered.

Plant Required.

Those packhouses which are equipped with a fresh water bath and heating facilities as part of their ordinary washing equipment, are in a fortunate position since the method involves only minor adjustments to the existing plant; but packhouses without these facilities will need a bath sufficiently large to allow of an even flow of fruit without causing bunching. A paddle or some similar device will have to be incorporated to assist in keeping the fruit moving slowly forward through the bath and drying tunnel on to the sorting table in an even-flowing stream.

The lighting obviously should be adequate.

Experience has shown that fruit immersed in water sufficiently hot to cause bubbling by any stung fruit will dry fairly quickly of its own accord after it has been extracted from the bath. The necessity of providing some additional means of drying will depend largely upon the length of time available for the fruit to dry before it reaches the grading table.

The heating facilities must be such that the water can be maintained at a temperature within certain limits and precautions must be taken against the danger of scalding. Some means of reading the temperature at a glance and of controlling it thermostatically is a matter of individual preference. Good results have been obtained by using an ordinary mercury thermometer of suitable range, and where one operator is made responsible for the control of temperatures, he soon learns by feel how to maintain the range within its effective limits.

The method of extracting the fruit from the bath by means of a slatted conveyor hardly needs describing. It is an efficient method as it extracts the fruit with a minimum of water disturbance, which is an important requirement throughout the period of detection. The capital outlay involved in the erection of a suitable bath is such that it should be included in the total outlay necessary for the erection of a plant required for the whole process of washing, where detection and extraction of stung fruits and the final washing of the fruits would become one operation. At the moment the suggested new method is essentially one for use by larger packhouses only, since these already have washing plants installed. Just how far the method can be modified to suit the smaller packer remains to be seen. No doubt our natural ingenuity will devise some simpler means of heating the water, of immersing the fruit and of taking it out again.

Temperature of Water in Relation to the Effectiveness of this Method.

It is realized that to lay down fixed limits of temperature and the most effective temperature within these limits, would at this stage be distinctly dangerous. This aspect requires further careful investigation. In the meantime it may be of interest to record the temperatures used at the two packhouses which up to the present have put the hot water method to the test.

It was found that a temperature of between 43° C. and 47° C. (109-4° F. and 116-6° F.) gave very good results. With a bath about four and a half feet in length a temperature below 43° C. tended to cause the stung fruits to bubble too late as they had already been picked up by the extracting elevator before they could be detected. The ideal, of course, is to cause the affected fruits to bubble somewhere about halfway along the line of flow, and the temperature which most effectively achieved this was one in the neighbourhood of 45° C. (113° F.). Once the maximum safe temperature has been established, the fixing of the most effective degree of temperature for the particular type of bath is quite simple, being merely a matter of regulating it for the distance the fruit has to float before being extracted by the elevator.

Danger of Scalding.

In the absence of accurate data on the maximum temperature of water before scalding of the oranges results, it can be recorded that on one occasion in a packhouse trying out the scheme, the operator responsible for the maintenance of the temperature at a certain level allowed it to rise to 49° C. (120° F.). The water was then almost too hot for the hand to bear. From the time of immersion of this fruit until it was loaded at the packhouse siding, no signs whatever of scalding were noticed, but whether or not the small quantity of fruit involved was represented in the percentage extracted at the port for examination, is not known. Apparently an orange can withstand, for a limited period, and without injury to the rind, a higher water temperature than the human hand.

It would appear that the period of immersion has a direct bearing on the danger of scalding. In fact, at the packhouse mentioned above, it was standard practice to remove all the fruits from the bath by hand whenever, for some reason or other, the machinery stopped, as it was thought that the longer immersion might result in damage to the rind.

Period of Immersion and Density of Flow.

It was observed that in a bath giving an undisturbed flow for a distance of four and a half feet, the fruits floated in the water for approximately three minutes, and also that the concentration of fruits had a direct bearing on the effectiveness or otherwise of the method. The ideal would be to have the fruits float in a single layer; this would unfortunately, in most packhouses, seriously retard the flow of fruit on to the sorting belt and could only be justified under special circumstances, such as shortage of labour, etc. In practice, with a bath of the measurements described earlier and with an elevator speed adjusted to the speed of the belts on the sorting table, the fruits float about three deep. With this concentration no difficulty was experienced in tracing any bubbles to their source.

Disturb Flow of Fruit as Little as Possible.

Heavier concentrations than three deep tended to mask the bubbling and affected fruits may be missed by too great a disturbance of the water during the search. In fact, it was proved that the more carefully the fruits were removed, the easier it was to detect stung fruits. If bubbles are detected as coming from a hidden source the fruits should be carefully parted until the affected one is exposed. Where any doubt exists that the exposed fruit is the affected one or not, the application of gentle pressure while holding the fruit under water will soon decide the issue. Another reason why the even flow of the fruit in the bath should be disturbed as little as possible, is that undue disturbance causes the fruits to flow on to the sorting belt in groups, making efficient grading much more difficult.

The Type of Skin Injuries and Imperfections the Bath will Expose.

(a) *Stings*.—No claims are made for the effectiveness of the hot water method in eliminating stung fruits at *all* stages. It is most efficient with very minute punctures, which, after all, are the most difficult to detect and are the cause of so much decay in the fruit during transportation. Records kept of the number of punctured fruits exposed by the baths revealed the following interesting facts:—

Frequent analysis of the fruit taken from the bath in packhouse A showed that 52.1 per cent. were obviously stung, 21.47 per cent. had punctures so minute that these could not be seen with the unaided eye, while in the balance of 26.43 per cent. the bubbles had been caused by either injuries or splits. The corresponding figures for packhouse B were: 36.56 per cent. obvious stings, 37.42 per cent. minute stings, and 26.02 per cent. injuries or splits. Against this, however, must be recorded the fact that a certain percentage of these fruits would in any case have been culled for other reasons such as malformations, excessive blemish, etc. These, taken over the total number of fruits analysed, represent just over 1 per cent. in the case of packhouse A and 4.4 per cent. in the case of packhouse B.

It is interesting to note that the number of visible stings in the fruit as it came into the packhouse was often as high as 10 per cent.

The greater percentage of punctures, not visible to the eye, found in the second packhouse can be accounted for by the fact that the stinging of fruits in that area was only commencing to appear, while in the other they had been contending with it in the packhouse for about ten days before this hot water method of detection was put into operation. As the fruit matures there is a tendency for the area immediately surrounding the puncture to decay with a sealing effect; such punctures will not, as a general rule, cause bubbles, but fortunately when the fruits reach this stage they are readily detected on the sorting belt both by the size and colour of the darkened wasty area and often by the heightened colour of the fruit.

In the case of false codling-moth punctures, where the grub has already emerged, a few large bubbles will rise to the surface, after which bubbling will cease. Here again, only poor grading and an overcrowded belt will result in the fruit being overlooked on the grading table.

Amyl Alcohol for Milk Testing.

S. Bakalor, Dairy Section, Agricultural Research Institute,
Pretoria.

THE Gerber and Babcock tests for fat in milk are among the most important contributions dairy science has made to the development of the industry and of dairy-cattle breeding. Unlike the slightly more exact ether extraction methods, such as the Roesé-Gottlieb method, the above methods are well adapted to field and factory conditions. In factories, these tests have made it possible to pay for milk and cream on the basis of the fat content. On farms, the results obtained by the milk-recorder have furnished valuable data to the dairy farmer and animal husbandry expert on which to base a selection and breeding programme for improving the butterfat content of milk. The Gerber method is used by testers in the field, whereas both the Gerber and Babcock methods are used in the factory test-room.

An essential reagent in the Gerber test is amyl alcohol, 1 cc. of which is used. It assists in the separation of the fat, by the other reagent, concentrated sulphuric acid, from the rest of the sample. The milk testing regulations for the Union lay down that the amyl alcohol used in the test should have a specific gravity of not less than 0.815 and not more than 0.818. Actually pure and impure samples of amyl alcohol have been found to have the same specific gravity (S.G.). For example, in one case two such samples both had a S.G. of 0.814 at 20°C. The above standard is thus unsatisfactory. A better standard to test the suitability of this reagent for milk-testing would be to lay down that it should give results which fall within 0.05% of those obtained with the Roesé-Gottlieb method. (Gerber tests are usually read to the nearest 0.1% fat).

During the past few years, a considerable number of samples of amyl alcohol have been submitted to the Dairy Section of the Agricultural Research Institute in order that their suitability for use in Gerber testing might be determined. Several samples were received from dairy factories which complained that too high results were being obtained in their tests. A number of these samples were found to give results between 0.1% and 0.4% higher than those obtained with pure amyl alcohol.

One of the above unsatisfactory samples had a distinct odour of amyl acetate instead of amyl alcohol.* When this particular sample was fractionally distilled, a fraction with a boiling point below 120°C. was actually found to contain amyl acetate. The fact that this sample of amyl alcohol, when fractionally distilled, did not have a constant and distinct boiling point, but showed a gradual increase in boiling point from about 90°C. to 126.5°C., indicated that it was a mixture of several substances and not a chemically pure substance. Three fractions with the following boiling points were collected during a distillation:

1. Below 120°C.
2. Between 120°C. and 125°C.
3. Between 125°C. and 126.5°C.

In addition, a portion which did not distil over and which was found to contain glycerine, remained.

Fractions 2 and 3, when used in Gerber tests, did not give

* The well-known confectionery, "pear drops", has an aroma very similar to that of amyl acetate.

incorrect results, whereas fraction 1 and the residue contained enough matter insoluble in sulphuric acid to give tests 0.25% and 1.4% too high, respectively. In this case amyl acetate and glycerine were the cause of the high test. O'Sullivan⁽²⁾, however, is of the opinion that amyl ether, either originally present in the reagent or formed during the test, can be the cause of such higher, incorrect results.

Testing of Amyl Alcohol Essential.

The above findings show how essential it is for dairy factories to test the amyl alcohol purchased by them before using it for determining the fat content of milk. The following tests may be applied in factories in deciding the suitability of amyl alcohol for milk analysis:—

In the method suggested by O'Sullivan⁽³⁾, 20 ccs. of pure sulphuric acid (the S.G. of which has been adjusted to 1.51 with distilled water) are placed in the Gerber butyrometer and 2 ccs. of the amyl alcohol sample are added. The butyrometer is stoppered, well shaken and centrifuged. No oily layer or globules should appear on top of the liquid. The stopper is now slightly loosened and the butyrometer is heated in water at 80°C (170°F) for approximately half an hour. It is again centrifuged. No oily layer should appear. The butyrometer is then cooled and 2 ccs. of water are added. The butyrometer is now allowed to stand overnight and is then again centrifuged. No oily layer should appear. The appearance of an oily layer indicates that the amyl alcohol is unsuitable for milk testing. (It may be found impossible to add the 2 ccs. of water mentioned above to the butyrometer owing to the volume of the other reagents. In such a case the test may be conducted without adding this water.)

Another method of testing amyl alcohol is to conduct a "blank" test, i.e. the Gerber method is performed in the usual way, but 11 ccs. of water are used instead of milk. If the amyl alcohol is impure, a fatty layer (often containing particles of dark suspended matter) will appear on top of the liquid in the butyrometer. Such amyl alcohol should be rejected.

REFERENCES.

- (1) C. W. ABBOTT.—Agricultural Research Institute—Unpublished data (1944).
- (2) D. O'SULLIVAN.—Analyst 60,306 (1935).
- (3) G. D. ELSDON AND G. H. WALKER.—Richmond's Dairy Chemistry (Fourth Edition, 1942)—Charles Griffin & Company, Limited, London.

New Bulletins.

The undermentioned Bulletins have recently been published:—

Bulletin No. 260., Nutrition of Poultry, Price 6d.

Bulletin No. 264., Turkeys, Price 3d.

These Bulletins are obtainable from the Editor of Publications, Department of Agriculture, Pretoria.

Milch-Goats.

FOR a number of years milch-goats have been in use in this country, and the question often arises as to whether they are economical. With our large herds of dairy cattle and numerous dairies it would hardly appear as if the latter is the case, but actually there are numbers of people to whom good milch-goats would bring great benefits.

In most towns there are people who are unable to produce or buy sufficient feed to keep a dairy cow. To such people a milch-goat will be very useful, since the scraps of food which are usually available in every household plus some additional food, will be enough to enable the milch-goat to supply the family with sufficient milk. Many people living along our railway lines are far from dairies and therefore have difficulty in obtaining fresh milk. Moreover, the feeding of a dairy cow also presents a problem to these people, and they would be well advised to keep a good milch-goat instead.

The abovementioned sections of the community find it very difficult to keep a cow in good productive condition throughout the year. In many parts of the country it is just as difficult to keep dairy cows on a farm.

The writer does not, however, advocate the keeping of a large number of milch-goats, for this practice would defeat its own ends. It is recommended that a few good she-goats which can be properly cared for, be kept.

The expenses entailed by such a scheme need not be very high. All that is required is a small, clean stable in which the animal is fed and milked.

Since no animal can produce unless it is properly fed, the judicious feeding of milch-goats is essential for good results. This is the reason why it would be unprofitable to keep large numbers of goats; for it is easier to give 2 or 3 goats the proper care than 10 or 12.

If the animals are given reasonable treatment an average of 4 to 5 pints of milk per day can be obtained from a milch-goat over a period of 300 days, and with proper treatment good goats may even produce as much as 2 gallons of milk per day.

The following are a few recognized breeds of milch-goats.

Saunen.—This breed is the best of the Swiss milch-goats, and may be regarded as one of the best in the world. It is a beautiful large hornless white goat. If fed under normal conditions these goats produce from 1,540 to 1,980 lb. of milk in a period of 300 days, and in certain cases they may even reach the 3,300 lb. mark.

The Tuggenburg goat is also a well-known Swiss breed. It is a brown animal with white markings on the head, has white legs, a white patch round the tail and is horn less. Its milk production is slightly lower than that of the Saunen.

In Great Britain the same types have been bred from other goats and the abovementioned, and breeds such as the British Saanen, British Toggenburg and British Alpine, give equally good results.

(N. G. Wessels, Sheep and Wool Officer, College of Agriculture, Grootfontein, Middelburg, Cape.)

Hot Water Immersion of Oranges :—

[Continued from page 842.]

An opinion has been advanced that a large proportion of minute stings, which in the normal course of events may not break down, will probably be eliminated by this method and that perfectly sound fruits may therefore be culled unnecessarily. The writer believes that the elimination of as much of the potential waste as possible is sound practice and that this will eventually justify itself.

(b) *Splits, mechanical injuries, punctures other than those caused by insects.*—These defects are also indicated by bubbling and in any case, with the possible exception of thorn punctures, are readily detected on the sorting belt.

Buttonless fruit, while immersed, will not bubble except when a portion of the rind, no matter how small, has also been torn away.

Proportion of the Surface Above Water Level when Fruits are Actually Floating.

Though this is dependent on the weight of the liquid contents in relation to the total weight of the orange, approximately one eighth of the surface of the fruit is above water level whilst the fruit is floating. It may thus be contended that, since about twelve per cent. of the fruit surface is not immersed, any minute punctures which may be on that portion of the fruit will not be detected. What actually happens is, that the fruit is totally immersed when it first plunges into the bath, so that the whole surface is wetted and remains so sufficiently long to cause bubbles to arise from any puncture or injury on the exposed surface.

Loss of Efficiency.

It was observed at both the packhouses previously mentioned that when the fruit had undergone a three- or four-day wilt there was a distinct loss of efficiency in the incidence of bubbling. At present any further explanation would of necessity be based on supposition. The method opens up an interesting field of investigation, however, and it may quite possibly have a very important bearing on the practical application of the principle of air expansion, induced by immersion in hot water, for the detection of minute punctures.

Acknowledgements.

Equal credit is due to Mr. O. J. Haasbroek, Packhouse Manager of the Crocodile Valley Estates (Pty.), Ltd., for initiating this method of detecting the presence of minute stings in the fruits. The management of the above firm is also thanked for its willingness at all times to try out any suggestions for improvement in the work.

New Bulletins.

The undermentioned Bulletin has recently been published :—

No. 249. Winter Pruning and Trellising of Vines. Price 3d.

This Bulletin is obtainable from the Principal, Stellenbosch-Elsenburg College of Agriculture, Stellenbosch.

The Farm Home.

(A section devoted mainly to the interests of Farm Women.)

The Preparation and Spinning of Wool.

Miss S. Snyman, Home Economics Officer, Department of Agriculture.

SINCE we in South Africa have so much wool of good quality at our disposal, there is no reason why women should not be able to make it up into useful articles.

Spinning and weaving are very useful, instructive and interesting pastimes, and a good quality thread may be spun at home for knitting or weaving. Although the hand-spun thread cannot be as uniform as the machine-spun thread, with practice a beautiful thread can be spun. Interesting colour combinations can be obtained by mixing the various colours. The slight unevenness actually lends a characteristic attractiveness to the thread.

The Washing of Wool.

Before being spun, the wool must be washed, teased and carded. Some people recommend that the wool should be spun in its original condition owing to the fact that the natural oils present facilitate spinning. The wool contains a large percentage of sand, and consequently it is advisable first to remove the sand and a portion of the grease to obtain a pure white thread.

If shorn wool is used, soak it overnight in lukewarm water, 1 T. of ammonia being added to every gallon of water. Carefully squeeze out the dirty water. Place the wool in a clean bath, cover with an old sheet and pour a warm soap solution over it. The sheet prevents matting. Allow to soak for a quarter of an hour, carefully pressing and kneading the wool in the soap solution. Remove the sheet, squeeze out the dirty soap solution and rinse thoroughly in several baths of lukewarm water until all the sand has been removed. At this stage the wool will still be slightly greasy and will, therefore, be suitable for spinning. If, however, the wool is dyed before spinning, it must be re-washed in a soapy solution until all the fat has been removed, otherwise the colour will not be uniform. Dry the wool in the sun and tease slightly while drying.

The washing process will be much easier if a skin with long wool (2 to 3 in.) can be obtained. In this case the skin is cut into 1-inch strips along the flesh side, with a sharp knife or a blade. These strips are washed just like the loose wool, except that a sheet is not necessary. When clean, the wool is shaken out and hung up to dry. Shake it out a few times while it is drying, to loosen. As soon as it is dry, the wool is cut off against the skin. If desired, the wool can be dyed before it is cut off. It will be found that wool which has been washed in this manner will not mat, and the teasing and carding process will be much easier.

The Dyeing of Wool.

The wool may be used white, dyed, or in the natural black or brown colour. Numerous interesting shades of grey and fawn can be obtained by mixing the natural black or brown wool with various quantities of white wool. Similarly any other shades may be mixed.

Wool may be dyed either in the unspun or in the spun condition. When dyed in the natural condition a more uniform colour is obtained and the dye penetrates the material more effectively. When dyed in the spun condition, it is twisted into skeins, tied together in a few places (not too tightly, otherwise the dye will not penetrate), weighed, washed, and then dyed. The same method of dyeing is applied to both types. Acid dyes are used for dyeing since these will not fade.

The dry wool is first weighed and the weight of the dye is calculated accordingly.

Take a large enamel saucepan with sufficient boiling water for the wool to float in. For every 100 oz. of dry wool, $\frac{1}{2}$ to 3 oz. of dye (according to the depth of the shade desired) is dissolved in boiling water and 10 oz. of glauber salts added. Care should be taken to ensure that the ingredients are thoroughly dissolved and mixed.

Rinse the wool in lukewarm water and immerse in the dye. Bring to the boil and boil for 15 minutes. Remove the wool and add 3 oz. of acetic acid (30 per cent. strength) to the water. Stir well and replace the wool. Boil for half an hour. Occasionally press the wool into the liquid, but do not stir.

Remove the wool from the mixture, rinse well in lukewarm water and dry. The wool may also be left in the dye until the liquid is cold. This gives a darker colour.

Tease the loose wool slightly while drying. Skeins of spun wool are shaken well and hung up to dry.

N.B.—1 ounce dye is equivalent to 3 T.

1 ounce glauber salts is equivalent to 2 T.

1 ounce acetic acid is equivalent to 2 T.

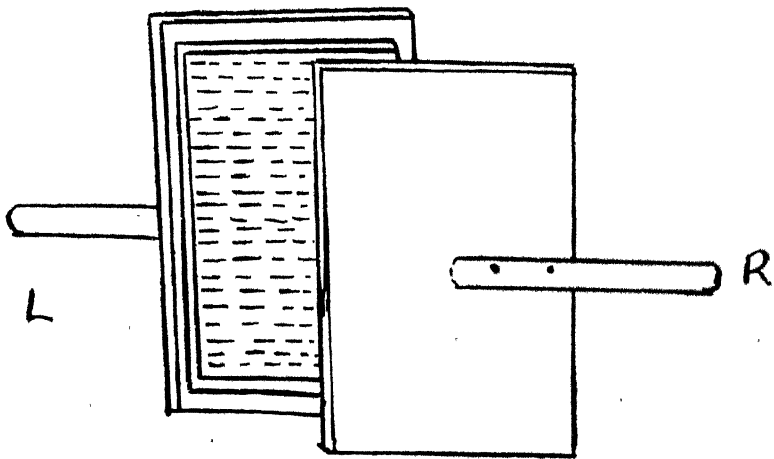


FIG. 1.—A pair of wool carders.

Carding of Wool.

For the carding of wool a pair of wool carders is employed. These consist of rectangular boards, to which pieces of leather with fine wire teeth have been nailed. First tease the wool well and remove stickiness and seeds. To tease, firmly hold a handful of wool in the left hand and pull out small amounts with the right hand.

Hold one wool carder in the left hand with the teeth facing upwards. Place a small quantity of wool on the carder. Hold the other carder in the right hand with the teeth facing downwards (Fig. 1) and card the wool by lightly drawing the top carder over the lower one about four times. Remove the wool from the lower carder by carding in the opposite direction. All the wool is now on the upper carder. Again lightly card four times and then remove the wool from the top carder; card again and remove the wool from both carders. The wool is now in a small roll; roll lightly along the teeth of one of the

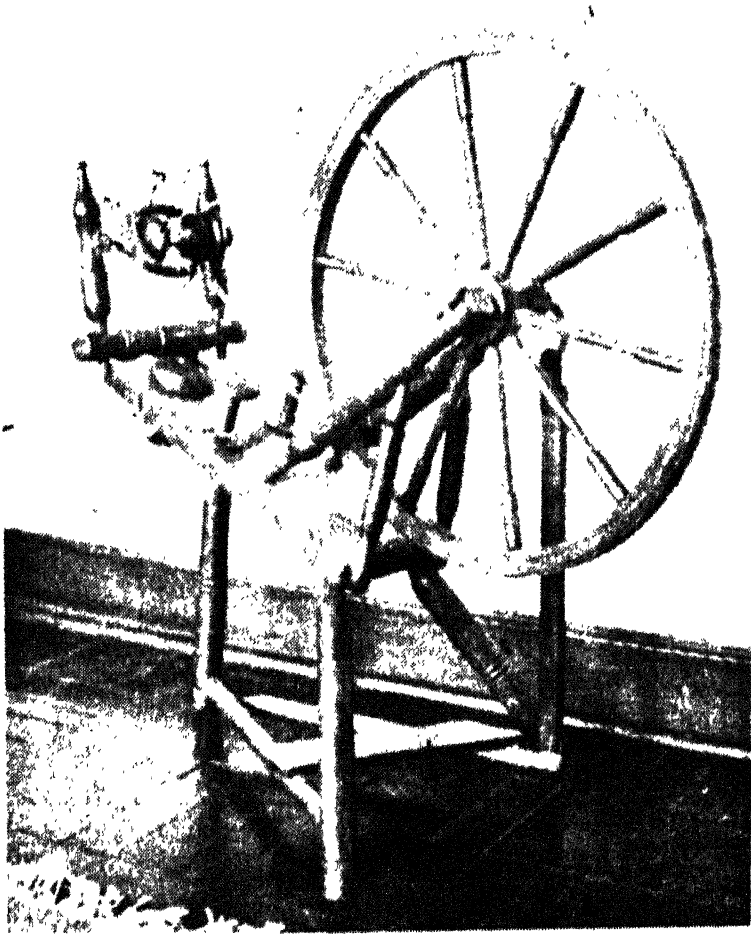


FIG. 2. —The spinning wheel.

carders. The carding of the wool is most important. Since uniform rolls facilitate spinning, it is advisable to practice until the rolls are perfect.

The Spinning of Wool and the Spinning Wheel.

By the spinning of wool or other fibre is meant that short lengths of wool or fibre are joined into one long thread of uniform thickness. In the spinning process short lengths of raw material are tightly twisted together. This process is considerably facilitated by the natural crimp of the wool.

The following are the chief parts of a spinning wheel (Fig. 2):—

1. The wheel, which is rotated by the treadle.
2. The spindle, a metal tube which holds the flyer and the bobbin in position. It is secured to the spindle supports with pieces of leather. The spindle has an eye at one end through which the wool is passed before it is wound round the bobbin.
3. The flyer, a horseshoe-shaped piece of wood with small hooks along each arm. The hooks regulate the winding of the wool on to the bobbin.
4. The bobbin, around which the spun wool is wound. It is essential for the bobbin to revolve smoothly round the spindle so that it may wind the wool as it is being spun.
5. The bobbin screw or wheel, over which one end of the driving cord passes.

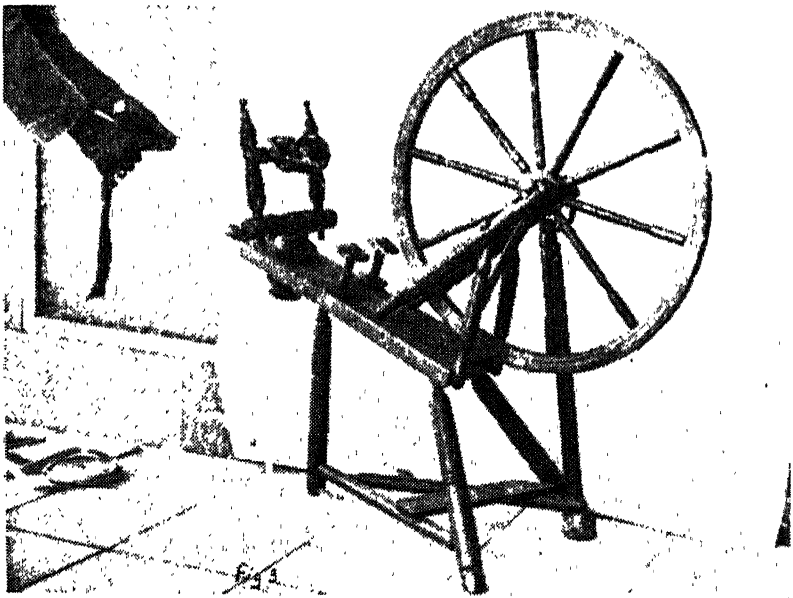


FIG. 3.—Showing how the thread is joined.

6. The driving cord, which connects the spindle with the driving wheel. It consists of one piece of tightly twisted string. The cord is fixed round the wheel in the following way: Loosen the tension screw at the front of the spinning wheel so as to move the spindle as close to the wheel as possible. Take a long piece of string, put this round the large wheel, then round the small wheel of the bobbin, then once again round the large wheel and then round the small wheel of the flyer. Tie the two ends of the string securely in a sailor's

PREPARATION AND SPINNING OF WOOL.

knot. As the string goes twice round the large wheel, it must cross. See to it that the point of crossing occurs on the lower section of the cord between the large and the smaller wheels. The tension screw must then be tightened somewhat.

7. The treadle which sets the wheel in motion.

How to Operate a Spinning Wheel.

It is advisable first to practice treadling. Even treadling is essential for good results in spinning. A slow movement especially should be practised, since a beginner's hands are not sufficiently dexterous to keep pace with a wheel which revolves too rapidly. The wheel should revolve to the right, i.e., clockwise. Once the wheel revolves with a slow and even motion, a start can be made with the spinning. Tie a small piece of pin thread, knitting wool for instance, to the bobbin. Pass the wool over the furthest hook of one arm of the flyer and then pass it through the other hooks, threading the end through the eyelet of the spindle and out through the small hole at the end. A wire hook is used in threading the wool.

Split the end of the knitting wool. Then take a piece of carded wool, pull it to a point and place this between the split ends. Hold the join between the forefinger and thumb of the left hand. Start the wheel slowly and let the twist thus made on the wool run up the join, which is held lightly between the fingers during the operation. When the join is secure, pull out one or two inches of the carded wool with the left hand to the thickness required and relax the right thumb.

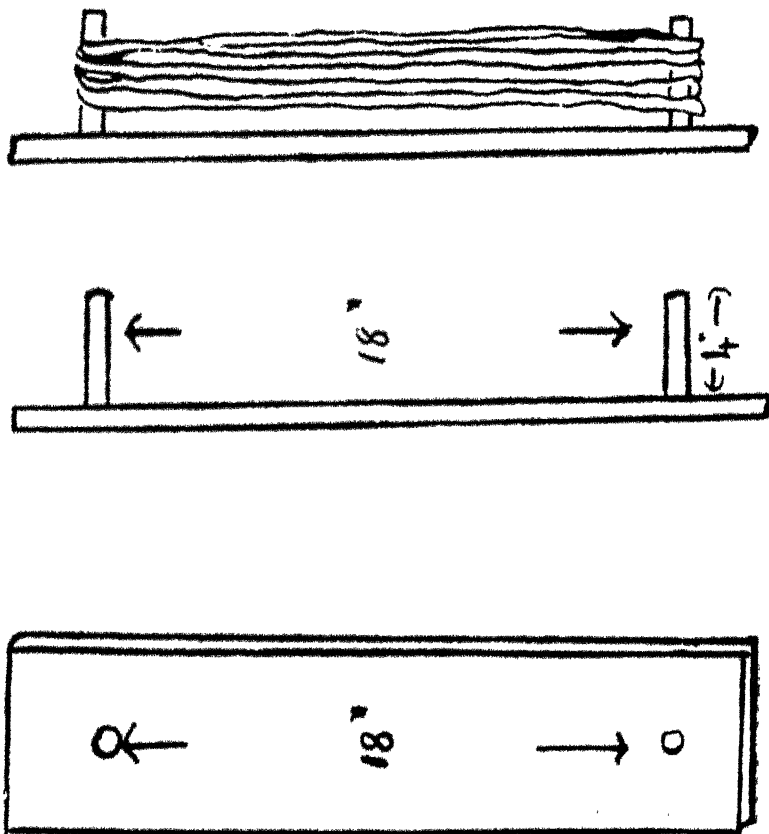


FIG. 4.—A skein winder made from a board and two pegs.

and forefinger (Fig. 3.) The twist will then rub along this wool.

Hold the wool again between the right thumb and forefinger at the end of the twist and draw out more wool from the carded lump with the right hand. Repeat this process slowly, keeping the wheel revolving by means of the treadle. Do not hurry, as the thread will be more likely to break, and do not attempt to get the thread too fine at the beginning.

When these movements have been mastered, try drawing out larger pieces of wool from the carded lump. This accelerates the spinning and gives a more even thread.

When one piece of carded wool has been spun, a fresh supply of wool is joined as already described.

With a little practice, the movements of the hands and feet will form a continuous rhythm and it is only in this way that an even thread can be spun.

As one section of the bobbin becomes full, remove the wool from the last hook and hook it round the next. In this way the wool is evenly distributed.

Too fast treadling will cause the wool to twist too much with the result that it will become knotted. This will also happen if the driving belt is too slack. The tension screw should then be tightened. The wool is also inclined to knot if held too tightly by the left hand which prevents it from being easily wound on to the bobbin. If, on the other hand, the wool is underspun, i.e., when it is not sufficiently twisted, due to the bobbin's revolving too rapidly, the driving belt must be slackened by loosening the tension screw. If the thread breaks, join in the same way as when starting on a new roll.

When two-ply wool is desired, two full bobbins of wool are first spun. Place the bobbins in two separate containers on the floor, pass the ends of both threads through the hole at the end of the spindle, round the hooks, and then tie them round the bobbin of the spinning wheel. Operate the treadle as before; the large wheel must, however, revolve to the left. The two threads are held lightly with the left hand.

When the bobbin is full, the wool is wound into skeins on a skein winder, the reason being that this facilitates washing or dyeing of the wool and the calculation of the amount of wool required. Before removing a skein of wool from the skein winder, it must be tied together in four places to prevent the wool from becoming tangled when it is washed.

For winding the wool into skeins, an effective contrivance can be made with a board and two wooden pegs (Fig. 4). Drive the pegs into the board 18 inches apart; each thread will then be one yard in length.

How to Wash Spun Wool.

The spun wool is washed in order to remove all grease and impurity. Soak the skeins for 20 to 30 minutes in lukewarm soapy water; ammonia may be added if the wool is very greasy. To wash the wool, it must be carefully squeezed in the water. Rinse well and hang up to dry. If the wool is to be dyed in the spun condition, it will now be ready for the dyeing process. If the wool is to be used in the white state, it is now ready for use. The wool spun by a beginner is unlikely to be suitable for knitting purposes or dress materials, but will be suitable for floor rugs and possibly for blankets.

(N.B.—Addresses for firms from whom dyes, wool carders and spinning wheels are obtainable will be furnished by the Senior Home Economics Officer, Department of Agriculture, on request.)

Crops and Markets

A Statistical and Economic Review of
South African Agriculture

by

The Division of Economics and Markets

Volume 25

DECEMBER 1946

No. 292

CONTENTS

	PAGE
Price Review for October 1946	853
Index of Field Crops and Animal Products	851
Prices of Dairy Products, 1946-47 Season	854
Agricultural Condition in the Union during October 1946	856
Maximum Prices of Eggs	856
The Prices of Wheat for the Season 1946-47	856
Prices of Oats, Rye and Barley	857
Index and Price Tables	858

Price Review for October 1946.*

Deciduous Fruit. Apricots, peaches and cherries were offered in small quantities towards the end of the month, and high prices were realized.

Citrus Fruit. Although the markets were well supplied with oranges, the demand exceeded the supply. Small consignments of navelties and lemons reached the markets.

Tropical Fruit. The supply of papaws was especially large, and in some cases the markets were glutted with over-ripe consignments which caused a decrease in prices. Pineapples and granadillas were offered in moderate quantities. Bananas were scarce and dear. On the Cape Town market the prices of bananas increased from 66s. 5d. per crate in September to 78s. 10d. per crate in October; on the Johannesburg market from 20s. 6d. to 28s. 6d.; and on the Pretoria market from 30s. 8d. to 34s. 6d.

Vegetables. In comparison with the previous month, vegetable supplies increased and prices decreased slightly.

Tomatoes. Tomatoes were plentiful and prices for good quality consignments were high. Sales were often weak owing to large quantities which reached the markets in poor condition.

Onions. Onion supplies decreased considerably and prices showed a sharp increase. On the Johannesburg market the prices of Cape onions increased from 25s. 3d. per bag in September to 28s. 1d. per bag in October; on the Cape Town market from 20s. 4d. to 32s. 5d.; on the Pretoria market from 23s. 2d. to 24s.; and on the Durban market from 23s. 3d. to 31s. 8d.

Potatoes and Sweet Potatoes.—The Johannesburg market was well supplied with lowveld potatoes, while consignments on the other

* All prices mentioned are averages.

markets were moderate. On all the markets maximum prices were maintained. The supplies of sweet potatoes on the market were small and prices high.

Fodder.—Teff and lucerne were well supplied. Oats were scarce.

Poultry and Poultry Products.—Egg supplies were satisfactory, but the demand for poultry products exceeded the deliveries.

Index of Field Crops and Animal Products.

As announced in the previous issue of *Crops and Markets* this index has been revised, the amended data being given elsewhere in this issue.

The most important alterations were brought about in the groups "Slaughter Stock" and "Poultry and Poultry Products". In the case of "Slaughter Stock" the index was revised as from May 1944, i.e. from the introduction of the Meat Control Scheme. An adjustment between slaughter stock prices before and since the coming into operation of the scheme had to be brought about as slaughter stock in controlled areas is at present sold on the basis of carcase weight (warm weight) and grade, whereas before the introduction of the scheme slaughter stock (with the exception of the Durban market) was sold on an estimated slaughtered weight *on the hoof* and the quoted prices included the receipts from offal and hide and skin. In order to get prices on a comparable basis during the application of the scheme, the net receipts for offal, hide and skin had also to be included. A certain arbitrary amount was thus taken into account at the time. Since then, however, more accurate data concerning receipts from offal, hide and skin have become available, on the basis of which the index for slaughter stock has been raised as from May 1944. The raised indexes are only a few points higher than the previous, but make no appreciable difference.

In compiling the index for "Poultry and Poultry Products" egg prices were replaced by the prices of a more representative grade of eggs and the revised index differs considerably from the previous. The tendency, however, remains the same, and, besides, the group constitutes only a small weight in the total (6 per cent.), so that the combined index is influenced very little by the alteration. Small changes were also brought about in the case of a few of the other groups, the indexes being only slightly changed, or not at all.

From the table it appears that the combined index increased by three points, from 197 in September to 200 in October. Hence there was a hundred per cent. increase since the basic period 1936-37—1938-39. The most important increases appeared in (a) the group "Other Agricultural Crops", viz. from 351 to 365 as a result of an increase in the prices of potatoes, sweet potatoes and onions; (b) the group "Pastoral Products", viz. from 163 to 170, due especially to a further increase in wool prices; and (c) the group "Slaughter Stock", viz. from 193 to 201, due to a further seasonal rise in the prices of slaughter cattle.

The only important decline occurred in the group "Hay", viz. from 183 to 166.

Prices of Dairy Products, 1946/47 Season.

Butterfat and Cheesemilk Prices.—In November 1945 the basic producers' price for butterfat was fixed at 1s. 11d., 1s. 9d. and 1s. 7d. lb. for 1st, 2nd and 3rd grade butterfat, respectively, and for cheesemilk at 10½d. per gallon (or 2s. 4½d. per lb. butterfat). These prices

were based on the results of an investigation into the costs of production of milk that milk, covering the year 1944-5.

Due to abnormally poor conditions which prevailed from November 1945 until February 1946, the output of butter and cheese amounted to only about 25 per cent. of that during the corresponding months in 1944-5. Consequently the prices were reviewed again, and the price of cheese-milk was raised as from 1 February by $\frac{1}{2}$ d. per gallon, and that of butterfat by 2d. per lb.

Since 1944-5 the costs covered by the survey (the costs increased appreciably, especially the cost of feed). The producers' price of meale for 1945-6 rose from 17s. 6d. per bag to 22s. 6d. (from 19s. to 20s. 6d. when purchased). The prices of feed oats and barley will go up about 20 per cent. as from the 1 November 1946, while the prices of other feeds have also advanced slightly. The bulk of the butterfat production has not been affected to the same extent as in the case of cheese-milk by the increase in the cost of feeds, but here the recent withdrawal of the railway rebate on cream again constitutes an important increase in the cost.

On the basis of these higher costs the basic price of butterfat has been raised by a further 1d. per lb. as from 1 November 1946, to 2s. 3d., 2s. and 1s. 10d. per lb. for 1st, 2nd and 3rd grade butterfat respectively, and that of cheesemilk by a further $\frac{1}{2}$ d. per gallon to 11 $\frac{1}{2}$ d. (or 2s. 7 $\frac{1}{2}$ d. per lb. butterfat).

The Price of Condensing Milk. As was the case in the past, the 1d. per gallon difference between the producers' price of condensing milk and that of cheesemilk in favour of the former was maintained, and the producers' price for milk was therefore fixed at 12 $\frac{1}{2}$ d. per gallon (or 2s. 10d. per lb. butterfat) as from 1 November 1946.

Butter and Cheese Prices. A thorough investigation into the costs of production of butter and cheese was undertaken jointly by the National Marketing Council and the Dairy Industry Control Board. The survey covered the 1944-5 season.

On the basis of information thus obtained the manufacturers' margins in the 1946-47 season were determined by allowing for increases in certain cost items since 1944-5. The Government was, however, not willing to increase the wholesale and retail price of creamery butter. Consequently, these prices remain unchanged, viz. 2s. 2d., 2s. and 1s. 10d. per lb. wholesale for 1st, 2nd and 3rd grade salted butter, respectively, and 2s. 4d., 2s. 2d. and 2s. per lb. retail. The increased costs of production and the higher prices for butterfat will consequently be covered by a further Government subsidy. In determining the price of cheese, calculations were based in the past on "underrun" and shrinkage of 12 per cent., i.e. 100 gallons of milk yield 88 lb. of cheese. On the basis of more recent data obtained and owing to the fact that cheese experiences a faster turnover at present, it was decided to reduce this percentage to 10 per cent. and in this way cover the increased cost of manufacture. Therefore the wholesale and retail prices of cheese also remain unchanged, viz. as follows:

Cheddar, wholesale. 1s. 7d., 1s. 6d. and 1s. 4d. per lb. for 1st, 2nd and 3rd grade, respectively, for quantities of 12 lb. and more; and retail: 1s. 10d., 1s. 9d. and 1s. 7d. per lb.

Gouda, wholesale.—1s. 7d. for 1st grade; and retail: 1s. 10d. for 1st grade.

Winter Premiums.—The same premiums as were paid last season will again be paid on butterfat and cheese-milk, viz. 4d. per lb. butterfat, and 2d. per gallon cheese-milk during June, and 6d. per lb. butterfat and 2 $\frac{1}{2}$ d. per gallon cheesemilk as from July until October.

For further particulars, see *Government Gazette* of 1 November 1946.

Agricultural Conditions in the Union during October, 1946.

Rainfall.—Scattered showers occurred throughout the country and brought relief everywhere. On the highveld and northern parts of the Transvaal, however, drought conditions still prevailed.

Pastures.—The widespread occurrence of showers of rain caused pastures to improve in general, but in certain parts such as the north-western Cape Province, the Karoo and over the whole of the Transvaal soaking rains were necessary in order to promote quick growth.

Stock.—The condition of stock was generally fair, especially in parts where rain fell. Lumpy skin disease still occurred in several parts of the Cape Province and Transvaal. Other stock diseases were quiet.

Crops.—Except for damage caused by hail in certain parts of the Eastern Free State winter cereal crops in general were very promising and good harvests were expected. Where rain occurred, farmers were busy ploughing and planting for summer cereals.

Maximum Prices of Eggs.

THE maximum wholesale and retail prices of eggs in controlled areas as fixed on 9 August 1946 (see *Crops and Markets* of September 1946) have been increased all round by 3d. per dozen for each grade as from 25 October 1946. (See *Government Gazette Extraordinary* of 25 October 1946.)

The Prices of Wheat for the Season 1946/47.

As announced by the Government in a press statement issued on 17 April 1946, the producers' price of wheat (i.e. basic price plus subsidy) was increased by 3s. per bag for class B grade 1 wheat in the 1946-47 season, with corresponding increases for the other classes and grades of wheat. Producers' prices for wheat in bags will therefore be as follows:—

	Class A.		Class B.		Class C.	
	s.	d.	s.	d.	s.	d.
Grade 1	41	0	40	6	37	6
Grade 2	40	4	39	10	36	10
Grade 3	38	10	38	4	35	4
Grade 4	—	—	35	9	32	9
Grade 5	—	—	32	9	29	9
Grade 6	—	—	29	2	26	2

These prices are f.o.r. producer's station and subject to an agent's commission of 9d. per bag in each case.

The producer's price was increased in order further to encourage the production of wheat.

Bread.—In November 1945 the price of bread was fixed at 7d. per 32-oz. loaf delivered. As from 17 May 1946 this price was changed to 6½d. per 29-oz loaf delivered. For the present season the price remains unchanged, viz. 6½d. per 29-oz loaf. The difference in the price of bread and the increased producers' price of wheat will be contributed by the Government in the form of a further subsidy.

Prices of Oats, Rye and Barley.

Feeding Oats and Barley.—Last year the producer's price of feeding oats and barley (Class B oats and Class C barley) was reduced from 15s. 6d. per bag (150 lb.) to 12s. 7d., the latter price being based on the selling price of mealies, and the feeding value of oats and barley as compared with that of mealies. This principle was introduced as a result of the large oat and barley crops of the previous season and the exceptionally large carry-over in October 1944. Mealies were then also still plentiful.

Since then the position has changed considerably. At present there is a great shortage of mealies and the demand for feeding oats and barley has increased. Furthermore, the producer's price for mealies has been increased from 19s. to 22s. 6d. per bag, while the selling price has been raised by only 1s. per bag, the Government subsidy being increased from 2s. 6d. to 5s. per bag.

To base the price of oats and barley on the selling price of mealies for the present season would thus unduly penalize the producers concerned. These products are not subsidized and are also subject to increases in the cost of production. In view of the scarcity of feeds, these cereals are also greatly needed and a certain amount of encouragement seems justifiable. Hence the prices were increased to 15s. 6d. per bag for grade 1 in each case for the present season.

Malting Barley (Class A and B).—A great shortage of malting barley still exists. This crop is largely grown on irrigated land and as a result of the current high prices for lucerne hay the production tends to decline. An increase in price is therefore desirable and prices consequently were increased for the 1946-47 season by 4s. per bag, viz., to 25s. per bag for Class A, grade 1.

Barley-wheat. Barley-wheat seed is very popular for the growing of green feed. Only very small quantities of seed are, however, being produced and some encouragement seemed necessary. Hence the producers' price for the present season has been increased by 7s. 6d. per bag (200 lb.) to 30s. per bag.

Rye. During the war years rye bread became an important substitute for wheaten bread. As a result of the shortage of wheat and the fact that rye does not compete directly with wheat since it can be grown to advantage in certain sandy areas where wheat production is very uncertain, the producers' price for rye for the coming season has also been increased, viz., from 25s. to 27s. 6d. per bag (200 lb.), grade 1.

The producers' price for the different grades and classes of winter cereals will therefore be as follows for the 1946-47 season:

Rye.

	s.	d.
Grade 1	27	0
Grade 2	26	6
Grade 3	25	0

Barley.

	Class A.	Class B.	Class C.	Class D.
	s. d.	s. d.	s. d.	s. d.
Grade 1 ...	25 0	24 0	15 6	30 0
Grade 2 ...	23 6	22 0	15 0	29 0
Grade 3 ...	22 6	22 0	14 0	27 6

	Oats.		Class A.		Class B.	
			s.	d.	s.	d.
Grade 1	16	0	15	6	15	6
Grade 2	15	6	15	0	15	0
Grade 3	—		11	0	11	0

The above prices are f.o.r. and are per bag of 150 lb., except in the case of rye and Class D barley where it is per bag of 200 lb.

Corresponding higher selling prices were also fixed for the above winter cereals. In the case of oats the selling price is 1s. 6d. per bag less where it is bought as stock feed.

For full particulars see *Government Gazette* of 25 October 1946.

Index of Prices of Field Crops and Animal Products. (Basic period 1936-37 to 1938-39=100.)

SEASON (1 July to 30 June).	Summer cereals.	Winter cereals.	Hay.	Other field crops.	Pastoral products.	Dairy products.	Slaughter stock.	Poultry and poultry products.	Com- bined Index.
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	
WEIGHTS.....	19	13	2	3	34	6	17	6	100
1938-39.....	92	109	96	89	79	102	108	91	93
1939-40.....	86	114	77	95	115	105	106	89	104
1940-41.....	108	120	106	156	102	108	110	103	109
1941-42.....	120	144	143	203	102	131	135	136	124
1942-43.....	160	157	144	159	122	147	168	167	147
1943-44.....	170	186	137	212	122	154	185	188	159
1944-45.....	183	186	160	281	122	177	178	184	164
1945-46.....	201	194	164	312	118	198	184	170	170
1945—									
January.....	184	186	177	250	122	159	178	199	163
February.....	184	186	171	235	122	180	177	217	165
March.....	184	186	182	245	122	180	177	233	166
April.....	184	186	173	246	122	180	176	259	168
May.....	198	186	173	288	122	184	170	273	172
June.....	198	186	190	320	123	184	176	275	171
July.....	198	186	191	316	118	210	180	188	170
August.....	198	186	191	330	118	210	185	162	169
September.....	198	186	187	368	118	210	189	149	170
October.....	198	186	189	371	118	210	192	147	171
November.....	198	194	194	380	118	204	193	153	172
December.....	198	194	194	337	117	204	192	177	172
1946—									
January.....	198	194	191	347	118	204	187	201	173
February.....	198	194	158	305	118	186	183	221	171
March.....	198	194	160	280	118	186	180	241	171
April.....	198	194	176	298	118	186	179	279	174
May.....	249	194	170	284	119	186	176	289	183
June.....	246	194	178	287	119	218	177	290	183
July.....	245	194	182	303	120	231	181	193	182
August.....	242	194	181	319	120	231	186	164	181
September.....	243	194	183	351	103	231	193	156	197
October.....	240	194	166	365	170	231	201	155	200

(a) Maize and kaffircorn.
(b) Wheat, oats and rye.
(c) Lucerne and tef hay.

(d) Potatoes, sweet potatoes,
onions and dried beans.
(e) Wool, mohair, hides and skins.

(f) Butterfat, cheese milk and
condensing milk.
(g) Cattle, sheep and pigs.
(h) Fowls, turkeys and eggs.

Average Prices of Cabbages, Cauliflower and Tomatoes on Municipal Markets.

SEASON (1 July to 30 June.)	CABBAGES (Bag. (a))			CAULIFLOWER (Bag. (a))			TOMATOES (Trays 15 lb.).			
	Johannesburg.	Cape Town.	Durban.	Johannesburg.	Cape Town.	Durban.	Johannesburg.			
							N.M. No. 1.	Other.	Cape Town.	Durban.
1938-39.....	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1939-40.....	3 10	3 0	3 10	3 0	1 8	3 5	2 2	1 3	1 8	0 10
1940-41.....	5 10	4 8	7 1	3 11	1 3	5 3	2 7	1 6	2 1	1 2
1941-42.....	8 10	5 5	11 5	5 9	5 7	7 11	3 1	1 9	2 3	1 6
1942-43.....	5 6	5 11	9 1	5 0	5 9	7 6	3 4	1 10	2 1	2 7
1943-44.....	11 1	7 1	17 6	9 2	6 2	12 1	5 5	2 9	3 7	2 0
1944-45.....	9 7	6 11	13 5	7 5	6 6	9 8	4 1	2 0	2 10	1 9
1945-46.....	10 1	7 1	10 11	1	6 5	11 1	1 11	2 1	3 1	1 7
1945—										
January.....	8 0	4 0	15 8	6 3	—	—	6 1	2 6	2 7	2 2
February.....	7 8	8 6	22 4	9 5	6 11	—	3 0	1 2	3 1	1 1
March.....	8 5	10 5	21 1	8 8	—	4 0	3 4	1 5	2 5	2 4
April.....	8 7	7 11	14 8	7 7	9 7	11 4	3 4	1 5	2 6	1 7
May.....	7 6	5 4	11 2	7 3	6 5	10 10	4 0	1 10	2 4	1 10
June.....	8 11	4 3	10 6	11 2	7 7	14 10	3 11	2 1	3 0	1 1
July.....	12 2	5 4	11 0	12 3	5 7	11 0	3 7	1 10	2 9	1 2
August.....	12 0	9 7	8 11	10 0	8 2	12 3	5 2	3 2	3 4	1 5
September.....	12 2	11 7	10 8	11 8	9 0	14 10	6 7	3 1	3 10	1 10
October.....	10 1	12 1	16 3	17 0	5 9	11 0	6 2	2 8	3 1	1 8
November.....	10 9	9 11	16 0	12 0	8 6	—	5 7	2 8	4 0	1 6
December.....	14 2	9 10	17 7	26 0	3 6	—	3 0	1 1	3 11	1 1
1946—										
January.....	9 7	8 0	14 8	14 5	9 0	—	4 3	1 10	2 5	1 3
February.....	7 3	9 1	18 1	10 10	6 6	—	4 2	1 7	1 11	1 3
March.....	8 11	5 3	14 4	12 2	9 8	3 4	6 2	3 8	2 6	1 6
April.....	9 10	5 8	9 0	6 7	15 4	12 4	8 1	3 6	2 8	2 0
May.....	8 4	3 4	7 7	7 2	5 3	8 11	6 3	2 11	3 8	2 3
June.....	5 10	2 4	11 0	7 7	3 1	12 1	4 2	2 0	2 10	1 5
July.....	7 11	1 10	9 9	8 6	—	11 3	2 2	1 1	2 3	1 0
August.....	5 3	2 1	7 1	8 9	3 2	11 1	2 5	1 3	1 11	0 9
September.....	4 11	2 5	5 8	9 6	4 0	13 7	3 2	1 9	2 2	1 1
October.....	5 6	3 0	7 0	15 10	3 0	12 0	4 5	1 9	2 8	0 11

(a) Weights of bags vary, but on the average are approximately as follows: For cabbages—Johannesburg, 150 lb.; Cape Town, 105 lb.; and Durban, 90 lb. For cauliflower—Johannesburg, 100 lb.; Cape Town, 65 lb. and Durban, 85 lb.

Average Prices of Green Beans, Green Peas and Carrots on Municipal Markets.

SEASON (1 July to 30 June.)	GREEN BEANS (Pocket 20 lb.).			GREEN PEAS (Pocket 20 lb.).			CARROTS (Bag. (a)).		
	Johannesburg.	Cape Town.	Durban.	Johannesburg.	Cape Town.	Durban.	Johannesburg.	Cape Town.	Durban.
1938-39.....	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1939-40.....	1 8	2 3	2 0	2 4	1 9	1 2	3 8	2 0	6 1
1940-41.....	1 11	2 9	1 5	2 8	2 4	2 3	5 9	4 11	13 4
1941-42.....	2 7	3 10	2 6	3 11	3 3	3 4	8 5	8 11	17 2
1942-43.....	3 1	4 3	3 0	3 3	2 10	3 9	5 1	8 9	20 2
1943-44.....	3 8	4 11	3 0	4 11	4 10	4 11	9 11	11 1	18 2
1944-45.....	3 7	5 1	4 1	4 9	4 1	5 5	8 3	9 11	19 10
1945-46.....	3 4	4 7	3 0	5 11	7 2	6 1	8 10	11 4	17 1
1946—									
January.....	1 10	0 11	2 4	4 3	1 9	6 7	7 7	3 1	10 2
February.....	1 7	3 4	2 3	5 5	6 9	7 4	7 8	6 11	19 1
March.....	2 3	4 11	2 8	7 7	12 0	6 7	9 5	6 3	25 4
April.....	1 11	2 8	1 10	4 4	6 6	4 0	8 5	18 9	19 6
May.....	3 3	5 3	2 3	5 9	9 11	3 1	9 5	8 7	21 6
June.....	4 3	4 2	5 0	4 9	7 9	8 8	10 0	10 10	18 9
July.....	9 10	7 10	5 10	8 2	11 7	8 8	10 1	16 4	20 11
August.....	7 4	6 4	6 10	5 8	7 10	5 5	13 4	17 11	12 11
September.....	3 1	5 9	4 1	2 8	4 1	2 4	7 5	12 8	16 8
October.....	3 8	5 4	4 9	4 4	3 6	7 7	9 6	9 10	20 11
November.....	1 6	3 4	2 4	9 0	4 0	9 4	9 8	8 8	16 4
December.....	2 4	2 3	2 8	12 1	—	12 5	10 9	7 10	18 10
1946—									
January.....	3 4	1 11	5 6	8 8	10 11	14 7	9 8	6 2	16 0
February.....	1 11	—	2 3	6 5	—	6 4	7 8	7 11	14 1
March.....	2 10	1 1	2 5	6 1	—	3 4	8 10	8 1	23 10
April.....	2 7	3 4	3 1	5 7	—	4 10	10 2	9 3	24 2
May.....	1 9	3 0	2 2	7 2	8 10	5 10	7 1	6 8	18 3
June.....	1 10	2 0	2 5	4 8	4 1	5 7	4 2	7 6	11 7
July.....	8 2	1 11	2 6	2 7	3 6	3 4	3 8	4 8	7 10
August.....	6 8	4 2	6 4	5 10	5 0	4 9	4 5	3 8	11 1
September.....	6 8	5 0	6 4	5 0	4 11	5 1	3 8	3 2	10 11
October.....	5 0	5 0	5 2	3 3	3 6	5 7	4 7	4 1	9 7

(a) Weights of bags vary, but on the average are approximately as follows:—Johannesburg, 180 lb.; Cape Town, 90 lb.; and Durban, 120 lb.

Index of Prices Paid for Farming Requisites.

Year and Month.	Imple-ments.	Ferti-lizers.	Fuel.	Bags.	Feeds.	Fencing Material.	Dips and Sprays.	Building Material.
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
Basis—								
1936-38...	100	100	100	100	100	100	100	100
1942.....	123	157	140	206	136	229	117	168
1943.....	144	171	154	237	152	239	127	179
1944.....	161	184	156	307	155	240	134	184
1945—								
January...	159	204	156	310	162	225	136	181
April.....	159	204	156	311	163	224	136	181
July.....	159	204	156	321	169	225	135	180
October....	159	204	146	321	166	225	135	179
1946—								
January...	155	204	146	314	168	218	135	174
April.....	152	204	146	304	163	213	134	174
July.....	152	199	130	308	167	214	134	176
Oct. (j)...	153	199	131	308	163	215	134	177

The following is the composition of the above groups. (The items are weighted according to their respective importance) :—

- (a) Ploughs, planters, seed-drills, harrows, cultivators, ridgers, mowers, binders, hay rakes, silage cutters, hammer mills, separators, windmills, shares, land sides, mouldboards, mowers, knives, pitmans, guards.
- (b) Superphosphate, ammonium sulphate, muriate of potash.
- (c) Petrol, power paraffin, crude oil, grease, lubricating oil.
- (d) Woolpacks, grain bags, sail twine, binder twine.
- (e) Mealies, oats, lucerne, groundnut oil-cake meal, bonemeal, salt.
- (f) Fencing wire, standards, baling wire.
- (g) Bordeaux mixture, lime sulphur, arsenate of lead, cyanogas, Cooper's sheep dip, Little's dip, Tixol cattle dip.
- (h) Corrugated iron, deals, cement, lime, flooring boards.
- (j) Preliminary.

I. A. R. 1. 75.

INDIAN AGRICULTURAL RESEARCH
INSTITUTE LIBRARY
NEW DELHI.

[illegible]

S. C. P.—1/8/47 P. J.—3-5-48-2000